



## Collins' Series of First-class School Atlases.

*Carefully Constructed and Engraved from the  
Best and Latest Authorities, and Beautifully printed in Colours,  
on Superfine Cream Wove Paper.*

---

### MODERN GEOGRAPHY—New Popular Series.

- The Public School Atlas**, consisting of 24 Maps, Crown 4to, neat Cover.  
**The Handy Atlas**, consisting of 32 Maps, Crown 4to, Stiff Cover.  
**The Clear School Atlas**, consisting of 34 Maps, Crown 4to, Stiff Cover.  
**The Clear School Atlas**, consisting of 44 Maps, with Index to every name on the Maps.  
**The Standard Atlas**, consisting of 16 Maps, Demy 4to, Pictorial Cover.  
**The Pocket Atlas**, consisting of 16 Maps, Crown 4to, folded in half, with Descriptive Letterpress.  
**The Compact Atlas**, consisting of 32 Maps, Crown 4to, folded in half, with Descriptive Letterpress.  
**The Junior, or Young Child's Atlas**, consisting of 16 Maps, 4to, with 16 pp. of Questions on the Maps, in Neat Wrapper.  
**The Colonial Popular Atlas**, consisting of 36 Maps, Demy 4to.  
**The Empire Atlas**, 24 Maps, Large 4to.  
**The Empire Atlas**, 24 Maps, Large 4to, with Copious Index.  
**The Progressive Atlas**, consisting of 40 Maps, 9 inches by 7½ inches, 4to.  
**The National Atlas**, consisting of 40 Maps, 4to, with a Copious Index.  
**The New Crown Atlas**, 64 Maps, Crown 4to, folded in half, and mounted on Guards, with Descriptive Letterpress, and a Copious Index, 8vo, cloth.
- 

### MODERN GEOGRAPHY—Imperial Series.

- The Advanced Atlas**, consisting of 44 Maps, Imperial 4to, cloth lettered.  
**The Academic Atlas**, consisting of 44 Maps, Imperial 4to, with a Copious Index, cloth lettered.  
**The Student's Atlas**, consisting of 45 Maps, and 6 Ancient Maps, with a Copious Index, Imperial 8vo, cloth lettered.  
**The Collegiate Atlas**, consisting of 45 Modern, 16 Historical, and 2 Ancient Maps, mounted on Guards, with a Copious Index, Imperial 8vo, cloth lettered.  
**The International Atlas**, consisting of 45 Modern, 16 Historical, and 14 Maps of Classical Geography, mounted on Guards, with Descriptive Letterpress on Historical Geography, by W. F. Collier, LL.D.; and on Classical Geography, by L. Schmitz, LL.D., with Copious Indices, Imperial 8vo, cloth.
- 

### AUSTRALIAN GEOGRAPHY.

- The Crown Atlas of the Australian Colonies**, consisting of 9 Maps, Imperial 8vo, Stiff Cover.  
**The School Atlas of the Australian Colonies**, consisting of 40 Maps, with Index, Crown 4to, cloth extra.
-

## COLLINS' SCHOOL SERIES.

---

### THE AUSTRALIAN READING BOOKS.

*Prepared by eminent Educational Authorities in Australia, and expressly designed for the use of Australasian Schools.*

#### PRIMER: PART I—

In Fcap. 8vo, cloth limp, Illustrated, 32 pp.

#### PRIMER: PART II—

In Fcap. 8vo, cloth limp, Illustrated, 48 pp.

---

#### FIRST BOOK—

In Ex. Fcap. 8vo, cloth, Illustrated, 80 pp.

#### SECOND BOOK—

In Ex. Fcap. 8vo, cloth, Illustrated, 176 pp.

#### THIRD BOOK—

In Ex. Fcap. 8vo, cloth, Illustrated, 256 pp.

#### FOURTH BOOK—

In Ex. Fcap. 8vo, cloth, Illustrated, 304 pp.

#### FIFTH BOOK, FOR BOYS—

In Ex. Fcap. 8vo, cloth, Illustrated, 400 pp.

#### FIFTH BOOK, FOR GIRLS—

In Ex. Fcap. 8vo, cloth, Illustrated, 400 pp.

---

#### READING LESSONS.

Primer, in Large Type, Illustrated, Mounted on 18 boards, and Varnished.

---

### AUSTRALASIAN GEOGRAPHY.

**Outlines of the Geography of Australia, Tasmania, and New Zealand.**

New and Revised Edition. With 3 Coloured Maps. Post 8vo.

**Manual of Australasian Geography—Political, Physical, and Commercial.** New and Revised Edition, with Illustrations, 8 Coloured Maps, and Index. Post 8vo.

---

*London, and Herriot Hill Works, Glasgow.*

Ida. M. Flood

343 Bourke St

Darlinghurst  
Sydney



Collins' School Series.

---



THE

AUSTRALIAN READING BOOKS.

---

FOURTH BOOK.

---

With Nineteen Illustrations.

---



SYDNEY:  
COLLINS BROTHERS & CO., LIMITED.



## PREFACE.

---

THE object steadily kept in view in this volume of the series is the enlargement of the pupil's vocabulary and the increase of his stock of ideas. For these purposes, it was necessary that the book should not only include a variety of subjects, but also afford examples of differing styles. On examination, it will accordingly be found that, in the selection of Lessons, variety is one of the most conspicuous features.

At the same time an attempt has been made to give information on many topics likely to be useful to boys and girls sufficiently advanced to be placed in a Third Class, while the desire to interest them has not been lost sight of.

The Appendix of Roots and Derivations will be found of great assistance in introducing words new to the pupils, and in showing the mode in which words are, so to speak, constructed. By a judicious use of Derivation the work of the Teacher in reading Lessons may be considerably reduced.



# CONTENTS.

*The Titles of the Poetical Pieces are printed in Italics.*

	PAGE
I.—Good Manners, - - - - -	7
II.—A Young Hero, - - - - -	11
III.— <i>Who is my Neighbour?</i> - - - - -	13
IV.—The Turkey, - - - - -	14
V.—The Ugly Duckling—Part I., - - - - -	17
VI.— <i>Shipwreck</i> , - - - - -	22
VII.—Cork, - - - - -	23
VIII.—Volcanoes, - - - - -	27
IX.—Autobiography of an Echidna, - - - - -	31
X.—Pure Water, - - - - -	35
XI.—Money, - - - - -	40
XII.— <i>The Heritage</i> , - - - - -	43
XIII.—Seals, - - - - -	45
XIV.—James Watt, - - - - -	49
XV.—A Day in an English Coal-Pit, - - - - -	53
XVI.—The Saxons, - - - - -	57
XVII.—The Compass, - - - - -	61
XVIII.— <i>The Song of Steam</i> , - - - - -	63
XIX.—The Mutiny of the “Bounty,” - - - - -	66
XX.—Presence of Mind, - - - - -	70
XXI.—A Lion Hunt, - - - - -	73
XXII.—The House Fly, - - - - -	78
XXIII.—The Ugly Duckling—Part II., - - - - -	81
XXIV.— <i>The Wreck of the “Hesperus,”</i> - - - - -	88
XXV.—The Sloth, - - - - -	91
XXVI.—The Gulf Stream, - - - - -	94
XXVII.—A Pet Monkey, - - - - -	98
XXVIII.—Moderate Exercise, - - - - -	101
XXIX.— <i>Different Countries Compared</i> , - - - - -	105
XXX.—King Solomon and the Hoopoes, - - - - -	108
XXXI.—Wages, - - - - -	113
XXXII.—What is a Plant? - - - - -	119

	PAGE
XXXIII.— <i>Lord Marmion and his Train</i> , - - -	123
XXXIV.—Eclipses, - - -	126
XXXV.—The Thermometer, - - -	129
XXXVI.— <i>The Battle of Flodden</i> , - - -	133
XXXVII.—Robert Clive, - - -	138
XXXVIII.— <i>Now is the Time</i> , - - -	143
XXXIX.—Needful Rest, - - -	146
XL.— <i>Apostrophe to the Ocean</i> , - - -	151
XLI.—The Simoom, - - -	153
XLII.—Alcohol, - - -	158
XLIII.— <i>Winter</i> , - - -	164
XLIV.—Salt Mines, - - -	166
XLV.—Labour, - - -	170
XLVI.—In the Dark Continent, - - -	173
XLVII.—The Normans, - - -	180
XLVIII.—The Dignity of Labour, - - -	184
XLIX.—Punctuality, - - -	192
L.—Insect Vermin, - - -	197
LI.—Foods of Different Nations, - - -	204
LII.—Magellan's Voyage, - - -	211
LIII.—Classification of Plants, - - -	221
LIV.—The Law, - - -	229
LV.—The Sheep, - - -	235
LVI.—Refreshing Drinks, - - -	241
LVII.—James Abram Garfield.—Part I., - - -	246
LVIII.—Judgment of Sancho, - - -	255
LIX.—Classification of Animals, - - -	258
LX.—James Abram Garfield.—Part II., - - -	265
LXI.—Soothing Drugs, - - -	274
LXII.—The Crocodile, - - -	281
APPENDIX OF ROOTS AND DERIVATIONS, - - -	287



# AUSTRALIAN READING BOOKS.

---

## FOURTH BOOK.

---

### LESSON I.

#### GOOD MANNERS.

Per-plex-it-y.	A-then-i-ans.	Re-tal-i-ate.
Mis-ad-ven-ture.	Ac-com-mo-date.	A-li-en-a-ted.
Dex-ter-ous-ly.	Em-bar-rass-ment.	Re-spon-si-bil-it-y.
In-fe-ri-ors.	In-ten-tion-al.	La-ce-de-mo-ni-ans.

To do to others as you would like others to do to you, is the golden rule of good manners. In other words, we should endeavour to please others in all those matters in which we desire them to please us; and we should try to avoid giving pain or annoyance, by any unnecessary act, that would be disagreeable to ourselves, if done to us. Of course, in laying down this rule, it is proper to remark that it applies only to the ordinary intercourse of life, for there are disagreeable actions which must be performed when they constitute a part of one's duty. A judge is not guilty of a breach of good manners when he sentences a man to be kept in prison, though the act is doubtless very unpleasant to the culprit; nor is a teacher rude when he chastises a disobedient boy, though the punishment is disliked by the offender. The difference between good and bad manners is illustrated by the following anecdote:—

A stranger, in crossing one of the public squares of a

large city, lost his hat, which was blown off by the wind. He vainly tried to regain it, for, as often as he stooped to seize it, a fresh gust would drive it beyond his reach. Seeing his perplexity, some of the passers-by began to laugh at the stranger's misadventure; and, when the hat was blown into a dirty street gutter, their shouts were long and loud. At this moment, a young gentleman, observing the stranger's distress, stepped forward, dexterously seized the hat, and restored it to the owner, with kindly expressions of regret at the annoyance he had experienced. The unmannerly crowd of laughers at once became silent, feeling that the young gentleman had given them a striking lesson in good manners.

The simplest points in good manners are those which concern ourselves in the first instance. Cleanliness of person, for example, is essential as a point of good manners, as well as for other reasons. The boy whose face and hands are dirty, and whose hair is in disorder, is offensive in himself before he speaks a word or performs any action, and, if his clothes be soiled or unbrushed at times when they ought to be in proper trim, he must also be considered unmannerly. There are, of course, occasions when, from the nature of a person's occupation, he cannot be clean in person or clothing, and he is then by no means liable to the charge of want of manners. No one finds fault with a blacksmith if, when he is at work, his hands and face are soiled with the smoke and dust of the forge. But if a boy, on his way to school, is dirty or untidy, he must **be accounted unmannerly**.

Good manners, however, chiefly concern our intercourse with others, and they may relate to our behaviour to our superiors, our equals, and our inferiors. Some persons take rank above us, because they are generally regarded as occupying a higher position in society; others, because

they hold certain offices to which power and responsibility are attached; some are superior by reason of their greater knowledge, skill, or ability; and others on account of their greater age. To all these there is due that kind of respect which we call *deference*, and which is shown principally by addressing them in the manner prescribed by good society, and by refraining from openly putting ourselves on an equality with them. Young persons are specially liable to forget this fact in their intercourse with the aged, for whom, indeed, something more than deference may be claimed. It is, perhaps, not saying too much to assert that they are entitled to *reverence*, and that they ought to receive it from the young.

The following story is told, by one of our most famous English writers, on the respect due to the aged. It happened at Athens that, on some public celebration, an old gentleman came too late for a place suited to his age and rank. A number of young men, who observed the difficulty and confusion the poor old gentleman was in, made signs to him that they would accommodate him if he came where they sat. The good man hustled through the crowd accordingly; but, when he came to the seats to which he was invited, the jest among the young fellows was to sit close, and expose the confusion and embarrassment of the old man to the gaze of the whole assembly. The frolic went round all the benches reserved for the Athenians. But, on these occasions, there were particular places set apart for strangers. When the good man, covered with confusion, came towards the seats appointed for the Lacedemonians, these honest, though less instructed, people rose from their seats, and with the greatest respect, received the old gentleman among them. The Athenians, being suddenly touched with a sense of the Lacedemonians' virtue and their own misconduct, gave a thunder of ap-

plause; and the old man cried out, "The Athenians understand what is good, but the Lacedemonians practise it."

Good manners to our equals require that we treat them with due respect, neither omitting any honour to which they are entitled, nor exhibiting towards them any intentional slight. Children, boys especially, are sometimes inclined to act rudely towards each other, by calling nicknames and making spiteful remarks. Such conduct provokes others to retaliate, either by pursuing a similar line of conduct, or perhaps in a still more unpleasant manner. Hence the frequent quarrels of children who, by such breaches of good manners, not only render themselves unhappy, but even cause trouble to their teachers and parents.

Many children think it odd that we should be required to show good manners to our inferiors. But, if it be right to do to others as we should like others to do to us, then it is right to do so to *all* others, including our inferiors. And, in fact, there can be no person, however humble his position, who is not entitled to consideration. Insolence or rudeness toward those who are less fortunate than ourselves, is a sure sign of a want of proper training or of true kindness of heart; while, on the contrary, the really great and noble will always show a kindly and courteous demeanour to those beneath them in rank or worldly position.

Good manners towards others may be considered a part of the respect we owe to ourselves, and the greatest advantage arising from the constant exercise of politeness is freedom from self-reproach. Still, as is the case with every other right course of action, a person accustomed to exhibit good manners in his general conduct will always reap other benefits from the practice. He will secure the

respect and good-will of others, who will be glad to oblige a person that is himself disposed to be obliging. And, while politeness assists in gaining friends, it is absolutely necessary to enable us to keep them. Good friends are apt to be alienated and lost by any breach of the rules of courtesy. Angry words, fault-finding, an inclination to contradict and dispute on trivial grounds, not to mention grosser acts of ill-breeding, set friends at variance, whose continual agreement might have been preserved by simply keeping in mind the golden rule before laid down.

It is clear that good manners can be practised by such persons only as possess, by nature or by training, good tempers. Self-control is the first requisite in politeness, as in some other good qualities; but even the gentlest dispositions will need instruction, and the quickest understandings will require to observe and reflect, before they can be perfect in manners. In short, in our intercourse with persons of every degree, we must bear in mind that every act or word of ours that unnecessarily rouses their tempers, wounds their feelings, or mortifies their self-esteem, is a breach of good manners.

---

## LESSON II.

### A YOUNG HERO.

Squad-ron.	Ad-mir-al's.	In-hab-it-ants.
Ex-ploits.	Ir-reg-u-lar.	As-ton-ish-ment.
Pen-sion.	Cel-e-bra-ted.	Il-lus-tri-ous.

IN the reign of King James II., an orphan boy, of the name of Hopson, was apprenticed to a tailor at Bonchurch, a little village in the Isle of Wight. War was

at this time declared with the Dutch, and a squadron of English men-of-war were collected off the coast of the Isle of Wight. The tailor's apprentice, seated on his master's shop-board when the ships were passing, was attracted by the sight. He hastened to the shore, and was seized with a strong desire to quit his trade, and serve on board one of these fine vessels. Jumping into a boat, he rowed up to one of the ships, which happened to be the admiral's. He was received on board, and the boat was cast adrift; it was picked up empty in a few days afterwards, and his hat, which in his hurry he had left behind, being found upon the shore, it was concluded that poor Hopson had perished.

The lad, having entered upon service, soon showed that the sea suited him much better than the tailor's board. The very next day they fell in with the enemy, and the admiral's ship was soon engaged with a Dutch vessel. After some hours' hard fighting the victory was still doubtful, when young Hopson, who had been very active, asked a comrade how long they should continue to fight? "Until that rag be hauled down," said the man, pointing to the enemy's flag. The ships were now so close, that their yard-arms touched each other. Hopson, hearing the man's answer, climbed up the mast into the rigging, and managed to clamber unseen from the yard-arm of his own ship to that of the enemy. He thence mounted to the maintop, seized the flag, and passed back with it to his own ship. The English, seeing the flag struck, shouted victory; and the Dutch, not knowing how it had happened, were soon thrown into confusion, and the ship was taken. When this was done, to the surprise of all, young Hopson descended from the rigging to the deck with the enemy's flag wound round his arm. Some of the officers were disposed to blame him for this irregular piece of



service; but the admiral commended his bravery, and rewarded it by promoting him upon the spot. Other occasions soon occurred to try his courage and skill, and he acquitted himself so well, that he rose rapidly to the highest honours. The most celebrated action in which he was engaged was the battle off Vigo, where he was in command as vice-admiral, at the beginning of Queen Anne's reign. Upon his return home he was knighted, and obtained a handsome pension from the queen. He now quitted the service, and resolved to pay a visit to the place of his birth. He had not once set foot in his native village since he left it as a runaway apprentice. Those inhabitants who remembered him as a lad, had heard of his exploits, without suspecting who the brave captain was. We can fancy how great must have been their astonishment when he appeared among them, and they learnt that the tailor's apprentice had returned to his native village as a brave and illustrious admiral, Sir Thomas Hopson.

---

### LESSON III.

#### WHO IS MY NEIGHBOUR ?

THY neighbour? It is he whom thou  
Hast power to aid and bless,  
Whose aching heart or burning brow  
Thy soothing hand may press.

Thy neighbour? 'Tis the fainting poor,  
Whose eye with want is dim,  
Whom hunger sends from door to door—  
Go thou and succour him.

Thy neighbour? 'Tis that weary man,  
 Whose years are at their brim,  
 Bent low with sickness, cares, and pain—  
 Go thou and comfort him.

Thy neighbour? 'Tis the heart bereft  
 Of every earthly gem;  
 Widow and orphan, helpless left—  
 Go thou and shelter them.

Thy neighbour? Yonder toiling slave,  
 Fettered in thought and limb,  
 Whose hopes are all beyond the grave—  
 Go thou and ransom him.

Where'er thou meet'st a human form  
 Less favoured than thine own;  
 Remember 'tis thy neighbour man,  
 Thy brother or thy son.

Oh! pass not, pass not heedless by;  
 Perhaps thou canst redeem  
 The breaking heart from misery—  
 Go, share thy lot with him.

#### LESSON IV.

#### THE TURKEY.

In-di-gen-ous.	Char-ac-ter-is-tic.	Vol-un-tar-i-ly.
Pe-cu-li-ar.	Do-mes-tic-a-ted.	Del-i-ca-cy.
Car-un-cle.	Var-i-e-ga-ted.	Dis-con-tin-ued.
In-cu-ba-tion.	E-ven-tu-al-ly.	Ex-cres-cen-ces.

THIS bird is not, as was once supposed, a native of Turkey, but is indigenous to North America, from which country it was introduced into Europe about the beginning of the sixteenth century. From its peculiar appearance, it is easily recognised. The head and upper part of the

neck are bare of feathers, but covered with wattles; and, in the case of the male bird, there projects from its head, just above the beak, a fleshy appendage or caruncle, which it can lengthen or shorten at pleasure. In the female, the caruncle is much smaller. The male bird is further distinguished by a tuft of long hair which hangs upon its breast. The tail is capable of being erected and spread out like that of a peacock. The changing colour of the wattles, the condition of the caruncle, the expansion of the tail, the proud strut, and the peculiar *gobble* or cry, are characteristic of the turkey.

In its wild state, the bird is larger and darker in colour than the domesticated kinds. In those parts of North America and the West Indies where large forests still remain, flocks of turkeys may yet be found. Although they seek their food and construct their nests upon the ground, they roost on trees, and like to ascend among the loftiest branches. They eat all kinds of grain, seeds, fruits, buds, grass, insects, and even young frogs and lizards, but the largest part of their food is believed to consist of green vegetable substances.

The domesticated turkey differs from its wild relations in being smaller and more various in colour. Poultry-fanciers recognise two principal kinds, called respectively the Norfolk and the Cambridge turkey. The former is black in colour and of smaller size; the latter is the larger variety, and may be obtained of many different colours, from very dark to pure white. Bronze and fawn colours are not infrequent, and some birds are variegated.

The turkey is one of the most valued kinds of poultry, on account of the quality of its flesh and eggs. It is, perhaps, owing to the difficulty of rearing the young that turkeys are less plentiful than other poultry birds; but

the warm dry climate of Australia is so thoroughly suited to its constitution, that a moderate amount of care suffices to secure success in this matter. Although very delicate when young, the turkey becomes eventually one of the hardiest of birds. It will endure without injury the fiercest storms, preferring to roost in the open air even in winter.

In a wild state, the male will destroy both eggs and young if he find them, and the female therefore strives to conceal her nest with the greatest care. It is, probably, owing to this instinct that she lays her eggs in the most retired spot she can find. But, while sitting, she gives little trouble, unless disturbed by strangers. In fact, she sits so constantly that, unless removed from her nest to feed, she would be liable to starve, as she is indisposed to leave it voluntarily. However, she requires to be watched while away, and to be put back after an absence of about twenty minutes if, as is likely to be the case, she forgets to return of her own accord.

The period of incubation is from twenty-six to twenty-nine days. In dry weather, the eggs should be sprinkled with water every day while the turkey is away from her nest to feed. On the day but one before the chicks are expected to break the shell, she should be well fed, the nest cleaned during her absence, and plenty of food placed within her reach as she sits; and she should not be again disturbed until the young ones are out. They should be left with their mother, and should not be forced to eat. Turkeys are very stupid birds at all times, and the chicks appear not to know how to feed themselves; but, by wetting their beaks with milk or water, they will learn soon enough the use of their mouths. Their first meal should consist of hard-boiled eggs, chopped very small, mixed with some green vegetable, such as lettuce. As

they grow stronger, crumbs of bread and maize meal may be added, and in about three weeks the eggs may be discontinued. Boiled potatoes, dry curd, and barley meal, if obtainable, are also suitable; and, as the young birds flourish, their diet may be the same as that of other poultry.

On account of the delicacy of young turkeys, they need great care until fully fledged and the red excrescences on the neck begin to develop. By feeding them in the manner above described, they will be saved from one great danger, but there is another equally destructive. They must be kept warm and perfectly dry; a wetting, no matter whether caused by rain, dew, or immersion in drinking water, is usually fatal.

---

## LESSON V.

### THE UGLY DUCKLING.—PART I.

Beau-ti-ful.  
Bur-dock.  
Slip-per-y.  
Im-ag-ine.

De-light-ful.  
Prop-er-ly.  
So-ci-et-y.  
In-tro-duce.

Spite-ful.  
Dis-pos-i-tion.  
Com-fort-a-ble.  
Fright-en-ing.

It was lovely summer weather in the country, and the golden corn, the green oats, and the haystacks piled up in the meadows looked beautiful. The stork, walking about on his long red legs, chattered in the Egyptian language which he had learnt from his mother. The corn-fields and meadows were surrounded by large forests, in the midst of which were deep pools. It was, indeed, delightful to walk about in the country. In a sunny spot stood a pleasant old farm-house close by a deep river, and from the house down to the water-side grew great burdock leaves,

so high, that under the tallest of them a little child could stand upright. The spot was as wild as the centre of a thick wood. In this snug retreat sat a duck on her nest, watching for her young brood to hatch; she was beginning to get tired of her task, for the little ones were a long time coming out of their shells, and she seldom had any visitors. The other ducks liked much better to swim about in the river than to climb the slippery banks, and sit under a burdock leaf, to have a gossip with her. At length one shell cracked, and then another, and from each egg came a living creature that lifted its head and cried, "Peep, peep." "Quack, quack," said the mother, and then they all quacked as well as they could, and looked about them on every side at the large green leaves. Their mother allowed them to look as much as they liked, because green is good for the eyes. "How large the world is," said the young ducks, when they found how much more room they now had than while they were inside the egg-shell. "Do you imagine this is the whole world?" asked the mother; "wait till you have seen the garden; it stretches far beyond that to the field, but I have never ventured to such a distance. Are you all out?" she continued, rising; "No, I declare, the largest egg lies there still. I wonder how long this is to last, I am quite tired of it;" and she seated herself again on the nest.

"Well, how are you getting on?" asked an old duck, who paid her a visit.

"One egg is not hatched yet," said the duck, "it will not break. But just look at all the others, are they not the prettiest little ducklings you ever saw? They are the image of their father, who is so unkind, he never comes to see me."

"Let me see the egg that will not break," said the old duck; "I have no doubt it is a turkey's egg. I was per-



suaded to hatch some once, and after all my care and trouble with the young ones, they were afraid of the water. I quacked and clucked, but all to no purpose. I could not get them to venture in. Let me look at the egg. Yes, that is a turkey's egg; take my advice, leave it where it is, and teach the other children to swim."

"I think I will sit on it a little while longer," said the duck; "as I have sat so long already, a few days will be nothing."

"Please yourself," said the old duck, and she went away.

At last the large egg broke, and a young one crept forth, crying, "Peep, peep." It was very large and ugly. The duck stared at it, and exclaimed: "It is very large, and not at all like the others. I wonder if it really is a turkey. We shall soon find it out, however, when we go to the water. It must go in, if I have to push it in myself."

On the next day the weather was delightful, and the sun shone brightly on the green burdock leaves, so the mother duck took her young brood down to the water, and jumped in with a splash. "Quack, quack," cried she, and one after another the little ducklings jumped in. The water closed over their heads, but they came up again in an instant, and swam about quite prettily with their legs paddling under them as easily as possible, and the ugly duckling was also in the water swimming with them.

"Oh," said the mother, "that is not a turkey; how well he uses his legs, and how upright he holds himself! He is my own child, and he is not so very ugly after all if you look at him properly. Quack, quack! come with me now, I will take you into grand society, and introduce you to the farmyard, but you must keep close to me or

you may be trodden upon ; and, above all, beware of the cat."

When they reached the farmyard there was a great disturbance, two families were fighting for an eel's head, which, after all, was carried off by the cat. "See, children, that is the way of the world," said the mother duck, whetting her beak, for she would have liked the eel's head herself. "Come now, use your legs, and let me see how well you can behave. You must bow your heads prettily to that old duck yonder; she is the highest born of them all, and has Spanish blood, therefore she is well off. Don't you see she has a red rag tied to her leg, which is something very grand, and a great honour for a duck; it shows that every one is anxious not to lose her, as she can be recognised both by man and beast. Come, now, don't turn in your toes, a well-bred duckling spreads his feet wide apart, just like his father and mother, in this way; now bend your neck, and say 'quack.'"

The ducklings did as they were bid, but the other ducks stared, and said, "Look, here comes another brood, as if there were not enough of us already! and what a queer-looking object one of them is; we don't want him here;" and then one flew out and bit him in the neck.

"Let him alone," said the mother; "he is not doing any harm."

"Yes, but he is so big and ugly," said the spiteful duck, "and therefore he must be turned out."

"The others are very pretty children," said the old duck with the rag on her leg, "all but that one; I wish his mother could improve him a little."

"That is impossible, your grace," replied the mother; "he is not pretty; but he has a very good disposition, and swims as well or even better than the others. I think he will grow up pretty, and perhaps be smaller; he

has remained too long in the egg, and therefore his figure is not properly formed; and then she stroked his neck and smoothed the feathers, saying, "It is a drake, and therefore not of so much consequence. I think he will grow up strong, and able to take care of himself."

"The other ducklings are graceful enough," said the old duck. "Now make yourself at home, and if you find an eel's head you can bring it to me."

And so they made themselves comfortable; but the poor duckling, who had crept out of his shell last of all, and looked so ugly, was bitten and pushed and made fun of, not only by the ducks, but by all the poultry. "He is too big," they all said, and the turkey cock, who had been born into the world with spurs, and fancied himself really an emperor, puffed himself out like a vessel in full sail, and flew at the duckling, and became quite red in the head with passion, so that the poor little thing did not know where to go, and was quite miserable because he was so ugly and laughed at by the whole farmyard. So it went on from day to day, till it got worse and worse. The poor duckling was driven about by every one; even his brothers and sisters were unkind to him, and would say, "Ah, you ugly creature, I wish the cat would get you," and his mother said she wished he had never been born. The ducks pecked him, the chickens beat him, and the girl who fed the poultry kicked him with her feet. So at last he ran away, frightening the little birds in the hedge as he flew over the palings.

"They are afraid of me, because I am so ugly," he said. So he closed his eyes, and flew still farther, until he came out on a large moor, inhabited by wild ducks. Here he remained the whole night, feeling very tired and sorrowful.

In the morning, when the wild ducks rose in the air,

they stared at their new comrade. "What sort of a duck are you?" they all said, coming round him.

He bowed to them, and was as polite as he could be, but he did not reply to their question. "You are exceedingly ugly," said the wild ducks.

---

## LESSON VI.

### SHIPWRECK.

THREE days and nights the boat stood out,  
And battled for its life;  
"We'll win through yet," the captain said,  
And buckled to the strife.

We cheered him then a feeble cheer,  
There was no breath to spare;  
For one hand held a fainting hope,  
And one a strong despair.

The sun went down behind the hills,  
The mighty hills of foam;  
And as the green the crimson caught,  
We thought of hills at home.

And here and there a sigh went up  
That might have been a prayer;  
There was no time for talking then,  
No place for weakness there.

Then, like a mighty ghost, arose  
The darkness of the night,  
Came on and on, close after us,  
Pursued and slew the light.

We drifted on, and on, and on,  
 We knew not how nor where;  
 And as the chill of morning came  
 We scarcely seemed to care.

Only the captain cheered us still:  
 "Tis darkness tries a man;  
 Fair-weather sailors are not we;  
 Let him despair who can."

And then our dying hopes sprang up,  
 Like lion from its lair;  
 It caught the traitor, Fear, and slew,  
 And left us strong to bear.

The daylight came; we sighted land;  
 The captain bared his head:  
 "I said we would win through, my men;"  
 And then he fell back dead.

We gained the land right speedily;  
 It was an island fair;  
 But 'twas a sad ship's company  
 Came off, and left him there.

---

## LESSON VII.

### CORK.

Ma-tu-rit-y.	Con-se-quent-ly.	Ser-vice-a-ble.
Sep-ar-a-ted.	Cus-tom-ar-y.	E-las-ti-ci-ty.
Al-ter-na-te-ly.	Op-er-a-tion.	Per-pen-dic-u-lar.
Ob-serv-a-ble.	Suf-fic-ient-ly.	Dis-tin-guish-a-ble.

THAT most useful substance called cork, is the thick, spongy, external bark of a species of oak. The tree, of which there are two varieties,—namely, the broad-leaved,

and the narrow-leaved,—grows to the height of upwards of thirty feet, and is a native of some of the southern parts of France, of Spain, Portugal, Italy, and Barbary; it bears a strong resemblance to the evergreen oak, and attains to a great age. When arrived at a certain state of maturity, it sheds its bark naturally, but the quality of the bark so separated is inferior to that which is obtained by removing it at a proper period. The true cork is the produce of the broad-leaved tree, and the chief supply of it is obtained from Catalonia, in Spain.

Many parts of Australia and New Zealand are well adapted for growing the cork-tree. As it is likely that they will become great wine-producing countries, there will always be an extensive demand for corks in connection with that industry, as well as for the other uses to which cork is applied.

The bark of the cork-tree which is an evergreen, is rough and spongy on the trunk and main branches, smooth and grey on the smaller branches, and white and downy on the young shoots. The leaves are of a bright colour, oval-shaped, with indented edges; they are smooth on the upper, and downy on the under side. They grow alternately on the branches, on very rough, though strong footstalks; and indeed, they differ very little from many forms of the evergreen oak. The acorns of the cork-tree are longish, smooth, and brown when ripe, and of the size and shape of some of our common acorns, to which they are so much alike as, when mixed together, not to be distinguishable. The narrow-leaved cork-tree is only a variety of the common sort.

The best cork of commerce is taken from the oldest trees, the bark of the young trees been too porous for use. They are, nevertheless, barked before they are twenty years old; and this first barking is necessary, to make way



for the succession of a better, it being observable that, after every stripping, the bark increases in value. The first crop is thin, hard, full of fissures, and consequently of little value. The cork is the bark which the tree pushes outwards, as is common to all trees ; but in the cork-tree the outer bark is thicker and larger, and in greater quantity, and more easily removed. When removed, the inner bark appears below it, and from this the cork is reproduced in the course of a few years. The trees are generally peeled over once in ten years.

In the collecting of cork, it is customary to slit it with a knife, at certain distances, in a perpendicular direction from the top of the tree to the bottom ; and to make two incisions across, one near the top, and the other near the bottom of the trunk. For the purpose of stripping off the bark, a curved knife, with a handle at each end, is used. Sometimes it is stripped in pieces the whole length, and sometimes in shorter pieces, cross cuts being made at certain intervals. In some instances the perpendicular and transverse incisions are made, and the cork is left upon the trees, until by the growth of the new bark beneath, it becomes sufficiently loose to be removed by the hand. After the pieces are detached, they are soaked in water, and when nearly dry, are placed over a fire of coals, which blackens their external surface. By the latter operation they are rendered smooth, and all the smaller blemishes are thereby concealed : the larger holes and cracks are filled up by the introduction of soot and dirt. They are next loaded with weights to make them even, and subsequently are dried and stacked, or packed in bales for exportation.

The uses of cork were well known to the ancients, and were nearly the same to which it is applied by us. Its elasticity renders it peculiarly serviceable for the stopping

of vessels of different kinds, and thus preventing either the liquids therein contained from running out, or the external air from passing in. The use of cork for stopping glass bottles is generally considered to have been introduced about the fifteenth century. The practice of employing this substance for jackets to assist in swimming, is very ancient; and it has been employed in various ways towards the preservation of life when endangered by shipwreck.

The floats of nets used for fishing are frequently made of cork. Pieces fastened together make buoys, which, by floating on the surface of the water, afford direction for vessels in harbours, rivers, and other places.

In some parts of Spain it is customary to line the walls of houses with cork, which renders them warm, and prevents the admission of moisture. The ancient Egyptians frequently made coffins of it. On account of its lightness, cork is used for false legs; and from its being impervious to water, it is sometimes placed between the soles of shoes to keep out moisture. When burnt, it constitutes that light black substance known by the name of *Spanish black*.

In the cutting of corks for use, the only tool employed is a very broad, thin, and sharp knife; and, as the cork tends very much to blunt this, it is sharpened on a board, by one whet or stroke on each side, after every cut, and now and then upon a common whet-stone. The corks for bottles are cut lengthwise of the bark, and consequently the pores lie across. Bungs, and corks of large size, are cut in a contrary direction: the pores in these are therefore downward,—a circumstance which renders them much more defective than the others in stopping out the air. The parings of cork are carefully kept, and sold to the makers of Spanish black.

## LESSON VIII.

## VOLCANOES.

Sculp-tures.  
Or-if-ice.  
Qui-es-cent.

Ant-arc-tic.  
Ve-su-vi-us.  
Per-cept-i-ble.

Re-peat-ed-ly.  
Phen-om-en-a.  
Med-it-er-ra-ne-an.



MOUNT EREBUS, ANTARCTIC CONTINENT.

A MOUNTAIN which contains within it molten matter, or appears to be on fire, is called a volcano. It is generally of a conical or sugarloaf shape, and on the summit there is commonly a cup-like hollow of greater or less extent, and named from its shape the crater. A volcano

is sometimes quiet and sometimes in a state of eruption. When in eruption the crater opens, and from the orifice are discharged smoke, steam, burning gases, and red-hot stones and ashes, while from the edge, or sometimes from a rent lower down, a stream of lava flows down the side of the mountain. This description does not apply to all volcanoes, however, for some vomit forth boiling water or liquid mud, while others emit only heated air.

Volcanoes exist in all parts of the world, but the chief fields of volcanic activity lie near the Pacific Ocean, in the Mediterranean Sea, and in Iceland. The Antarctic continent also possesses volcanoes of great size and power. Those volcanoes which are now, or may at any time pass into a state of eruption, are styled *active*; while those that are no longer liable to break out in this way are said to be *extinct*.

One of the most active volcanoes known is Mount Vesuvius, which, for more than two thousand years, has, after intervals of rest, repeatedly broken out and caused great destruction. An account of one of the most terrible eruptions of this mountain has been handed down to us, so that we can learn all that took place at that remote period, eighteen hundred years ago. Shocks of earthquakes had frequently occurred for some days previous to the eruption, and a strange umbrella-shaped cloud had hung over the top of the mountain. At last flames broke out of the summit; cinders, pumice-stone, and ashes, were thrown up in such quantities as to darken the air, and render it impossible to distinguish day from night. Moreover, the quantity of matter ejected by the volcano was so great that three flourishing cities were buried beneath the cinders, ashes, mud, and lava. Portions of two of these cities have since been uncovered by the removal of the ashes, and paintings, sculptures, and many

other relics of those ancients have been brought to light.

Some of the most terrible volcanic eruptions on record have occurred in the island of Java, in the Indian Ocean. One of the numerous volcanoes in the island had so long been quiescent that the residents in the neighbourhood supposed it to be extinct. It was a lofty mountain, the sides of which were clothed with a dense forest, while at its base were numerous villages. The crater was not deep; and, instead of flames and molten lava, nothing could be seen in it but soft green grass. From the hill-side rivulets flowed down towards the sea, watering in their courses beautiful and fertile valleys. In July 1822, one of these rivers became muddy, and its waters heated. But, though this occurrence must have seemed strange, no one suspected it to indicate danger, and the population of the villages remained in their homes. A few months after, without the least warning, a terrific eruption took place. A loud explosion was heard; the earth shook; and immense columns of hot water, boiling mud, ashes, and stones, were hurled upwards from the mountain top with such force that some of the erupted matter fell to the earth at a distance of forty miles. Much damage was done, and the face of nature was greatly changed. Many of the rivers changed their courses, and hills suddenly arose where formerly the land had been perfectly level. A still more terrible outbreak occurred in August 1883. An eruption in the island of Krakatoa, in the Straits of Sunda, on the west of Java, was followed by disastrous results. Several mountains disappeared, islands sank into the sea, and others appeared for the first time. The general appearance of the coast line on the Straits of Sunda was completely changed; and fresh soundings had to be taken to render its navi-



gation a matter of safety for ships. A great tidal wave swept the west coast of Java, causing much damage to property, and enormous loss of life. It was estimated that about eighty thousand persons lost their lives by this terrible catastrophe.

In one of the coldest inhabited countries of the world, Iceland, the eruptions of volcanoes are equally terrible. The coldness of the climate, and the great height of the mountains, cause great quantities of snow and ice to cover the volcanoes, and the valleys and gorges at their side. As soon as an eruption commences, the intense heat of the molten lava converts the ice and snow into water, which rolls in a deluge down upon the plains, and carries with it huge masses of ice and rock. Some of the volcanoes in this island, however, are still more remarkable for the floods of lava which they pour forth. One of these streams was fifty miles long and fifteen broad, and in some places was more than five hundred feet deep.

The volcanoes of South America differ among themselves, some pouring out water, others lava. Among them is one of the most active volcanoes in the world. For three hundred years it has continued to pour forth a stream of mud and water, or to eject ashes. The latter sometimes fall to the ground in places a hundred miles distant from the mountain.

Traces of volcanic action are perceptible in various parts of Australia, and still more in New Zealand, in which latter country active volcanoes exist. The eruptions in recent times have not been of the terrible character which usually marks such phenomena, though slight shocks of earthquake are by no means infrequent.

LESSON IX.

AUTOBIOGRAPHY OF AN ECHIDNA.

Mys-ter-ies.	Bur-ra-go-rang.	E-go-tis-tic.
Mag-nif-i-cent.	Wol-len-dil-ly.	Par-ti-cip-a-ted.
Tim-id-it-y.	Com-pres-si-bil-it-y.	Par-a-sit-ic-al.
At-ten-u-a-ted.	Ef-fec-tu-al-ly.	Un-cer-e-mo-ni-ous-ly.

I AM not of an egotistic turn of mind. On the contrary, I am, as everybody allows, rather shy and retiring in my disposition. Nevertheless, I venture to relate my own story, not that I can enlighten you upon the mysteries which are acknowledged to appertain to myself and companions. Professor Owen and other great men who have displayed such interest in us, would be right glad to acquire reliable information concerning our social habits, our birth, and especially mamma's mode of nourishing her young. On some of these points, these gentlemen probably know as much as myself.

My early days were spent on a sunny hillside overlooking the Burragorang Valley, a wild, wonderful place, into which it seems impossible to find a way, and from which there appears to be no means of escape. From my haunt, I am told, for I never looked so far myself, magnificent scenery delights the eye, mountain, rock, and forest, contrasting beautifully with the verdant plain below, through which the Wollondilly winds its silver way. Here I led a peaceful happy life, caring nothing for the prowling dingo, or for the more dreaded snake. One day when basking in the pleasant sunshine, I was startled by the barking of a dog; and though not in the least afraid of the creature, took the precaution to roll myself up like a ball—our usual course when disturbed—presented my spines to the world standing straight out and threatening,

and thought myself safe from every ill. But in this I was mistaken, for the dog was accompanied by another creature, of a kind I had never before seen, but with which I was fated to form a more intimate acquaintance. It was a *man* that thus introduced himself to my notice, and who most unceremoniously thrust me into a bag and carried me off, at first on his back and afterwards on a packhorse. In this way, I left the place of my nativity and my friends, none of whom do I ever expect to see again.

The journey I had to perform was long and tiresome. The shaking and jolting on the horse severely tested my muscles, and but for the strength of my claws in clinging to the bag I must have dislocated every joint. I would rather remain an ignoble captive in my present home than regain my liberty by again undergoing such a trial. But even the worst roads have an end, and at length I reached my present place of abode.

Here I was, for a time, an object of interest. Young and old flocked to the place to have a view of myself and my perfections. I regret to say that I did not behave well under inspection by these lords of the creation. My natural disposition—which was, I may truly say, entirely misunderstood by the spectators—led me to hide my head and exhibit only my spines. How often—my owner himself has admitted this truth—is diffidence mistaken for hostility! The individual feels nothing but timidity; the observer sees nothing but prickles.

My powers as a digger are well-known; better known than trusted, in fact. For this reason, it was difficult to find for me a secure place of confinement. Moreover, I felt it incumbent upon me to show that I was not altogether destitute of other useful accomplishments. These I felt bound to manifest to the world, and I began by



showing the great compressibility of my person by squeezing through the wooden bars of my habitation, a space of little more than an inch. On another occasion I effected my temporary release from an open box, eighteen inches deep, by standing on my hind legs in a corner, and drawing myself over the top by the combined use of my snout and forelegs. It was not an easy task to replace me in the box; for my coat effectually forbids impertinent freedoms in handling me. Once I was discovered in an attempt to explore the interior of a watering pot, with half my body in and half out. Long and vain was the effort to dislodge me on the part of my master, who, at last, allowed me to work my way in, when I was able to turn round and quietly retire. Finally I was lodged in a large box, the bottom of which was covered with sand.

Although I lived long in this habitation and was daily fed, I never became tame or trusting, and when touched, could never refrain from rushing into a corner. From this retreat, it would have been no easy task to remove me, were it not that in my efforts to conceal my head, I always exposed my hind legs. Then it was that my master, watching his opportunity, would seize one of these legs and hold me up, head downwards, and at full length. Captivity brought with it a new diet. Instead of the accustomed meal of ants, or more delicious ants' eggs, I had to acquire a taste for bread and milk. This diet did not entirely meet with my approval, and the change to raw eggs, subsequently made, was much more to my taste. My allowance was one egg a day, though I often was favoured with a second, merely to give a chance visitor an opportunity of seeing me eat—no, that is not the word—feed. It was thought a matter of wonder that my tongue resembles a worm, that it could be extended two inches beyond my snout, and that it could be extruded

and withdrawn so rapidly that these movements could scarcely be detected.

Although a captive, I was spared the misery of a solitary life. A companion was brought to share my lot. At first, I eyed him with jealousy, for I heard it whispered that he was better-looking than myself. He was described as black, myself as brown; he was plump, while my somewhat attenuated frame showed clearly that I had been confined and fed on unnatural food. However, a fellow-feeling makes us wondrous kind, and we soon became good friends. My comrade partook of my food and shared my lodging; and after a time participated in its discomforts. Foremost of these was one which was clearly a relic of the troubles incurred in our native freedom.

Long before the arrival of my companion, my master noticed on my ear a white appendage about the size of a small pea. He examined it, wondered at it, found a similar but smaller on the other ear, and arrived at a conclusion. It could, he thought, be nothing but a secretion, and, wonderful discovery, no naturalist had hitherto mentioned such a fact. The little lump was closely watched as it expanded day by day, till when it had grown to the size of a large pea, it fell off. It then underwent a careful examination, was opened, and found to be filled with blood. The bag or covering was dried and laid by as a curiosity and as evidence of the discovery that was about to be published to the world. At last, it was placed in the hands of a gentleman well acquainted with "bush" lore, and by him pronounced to be a *tick*. Examination of the remaining lump showed that he was right. I had long been annoyed by these parasitical blood-suckers. Both of us had our share of them, though we generally contrived by a vigorous application of our hind claws to scratch them off our heads before they grew very large.

It was only about our ears that they could remain for any length of time.

The history of my remaining days is neither varied nor interesting. Shut up in a box, I could do nothing but eat and sleep, so passed some months. It would boast little to tell the number of times I escaped from my prison by making stepping-stones of the articles placed in it, the distance travelled during each temporary release, how I almost reached the garden, how I nearly scratched through the pine floor, or how strenuously but vainly I exerted myself to drag away a board that covered a hole. We lived on in the even tenor of our way, having our food varied to bread and milk and corn-flour as eggs became scarce and dearer. The warm weather, close confinement, and unsuitable food at last produced their natural effect;—my companion sickened and died. After his death and burial, I felt lonely, and when my master left me for a time I had my fears that he would feed me no more.

---

## LESSON X.

### PURE WATER.

Chol-er-a.  
Ex-am-ined.  
Chem-is-try.  
At-mos-phere.

Im-preg-na-ted.  
Il-lus-tra-tion.  
Pal-at-a-ble.  
Veg-et-a-ble.

Con-tam-in-a-ted.  
De-bil-it-a-ted.  
Sci-en-tif-ic.  
Im-per-cep-ti-bly.

WHEN may water properly be called pure? Are we to judge by sight, taste, or smell? Unfortunately our senses, by themselves, do not afford us sufficiently accurate means of deciding as to the purity of water, for this necessary of life may be impregnated with poisonous substances, and yet appear to be perfectly free from taste

or smell. A very remarkable illustration of this truth once occurred in London during an outbreak of cholera. A certain well which supplied a number of houses was noted for its bright, sparkling, palatable water. Nevertheless, every person who drank from that well was seized with cholera. The reason could not be divined until the water was examined by a man of science, who found it charged with poisonous matter. The science which inquires into the composition and qualities of substances is called *chemistry*, and a person who studies it is styled a chemist. By the aid of this science we learn that water, like air, is composed of two gases, oxygen and hydrogen, in the proportion of eight parts of the former to one of the latter. Perfectly pure water, therefore, will consist of these two gases in a state of union, unmixed with any other substance.

In common practice, however, we are accustomed to speak of water as pure when it does contain other substances. For example, water has a great liking for—that is, it takes up or absorbs—gases, such as atmospheric air and carbonic acid gas. In these two cases the water would be considered pure. Again, water has a great power of dissolving solid substances. Lime, for instance, is soluble in water, and if the quantity dissolved is small the water is still regarded as pure, and even wholesome. Sometimes water is strongly impregnated with mineral substances, iron, sulphur, soda, and others. Such waters we term mineral waters, but we do not deem them impure. Though salt, the sea water must be held to be pure water. But fresh water that contains decaying animal or vegetable matter, or the gases thrown off from these substances, is impure, poisonous, and dangerous to life.

Animals need pure water as much as they need fresh

air and wholesome food. In fact there can be no wholesome food for man without pure water. A loaf of bread is nearly one-half water; and if the water used in making the loaf is bad, the loaf cannot be wholesome. Moreover, the bodies of animals consist, to a large extent, of water, which is constantly being expelled through the skin and lungs, and new supplies are therefore frequently needed. When our bodies require a new supply of water we experience the feeling called *thirst*, as hunger denotes the want of solid food. We have read many stories showing the sufferings produced by long abstinence from water, and deaths from thirst are known to be not infrequent in the Australian bush. Plants also suffer from want of water; they languish, wither, and die.

It will be useful to inquire how the water acts that we drink, for we can then see the reason why pure water is so necessary. When swallowed, the water is received into the stomach, where it is, in part, mixed with the food. The solid particles of food are said to be suspended in the water drunk, which carries them along through the whole process of digestion until they are poured into the blood. The watery portion of the blood carries the rest throughout the whole body, and brings back the waste matter. These are the two great services performed by water in the human body:—it conveys nourishment to every limb or member, and brings back the waste matter which would be poisonous if retained in the system, and carries it completely away by the lungs, the skin, or the kidneys. Now if the water we drink be not pure, but impregnated with some deleterious substance, it is clear that instead of supplying nourishment, it will carry a poison to the various organs of the body. Such poisons act upon special organs, such as the digestive apparatus, or upon the blood generally, and thus produce diseases.



But in both cases the blood is contaminated, and the diseases which ensue are said, in common speech, to be the results of blood-poisoning.

In a less, though still in an important degree, pure water is necessary for the other great purpose it serves to human beings, that of cleansing the skin. Water brings waste matter to the skin, through the pores of which it reaches the surface. Here, in the absence of friction and water, it accumulates, clogging the pores, and preventing other waste matter from leaving the system which, sooner or later, feels the effect of the poison it contains. Moreover, the skin itself, being prevented from performing its proper functions, becomes diseased, and causes annoyance and suffering. Many of the diseases to which savage nations are liable result from neglect of cleanliness. But, if the water used for cleansing the person be itself impregnated with poisonous matter, it will be unpleasant and liable to cause disease.

The sources of impurity in water are numerous and diverse, but four may be specially mentioned. They are, the presence of decomposing vegetable matter; the presence of decomposing animal matter; the admixture of deleterious gases; and the presence of certain minute vegetable growths. As an illustration of the first of these cases, we may refer to water obtained from a swamp or marsh. The vegetation growing in and near the marsh will, at certain seasons, fade and die. Falling into the water it commences to rot, and in this state it is highly poisonous. Generally, it emits a most offensive odour, and the water in which it is suspended is unpleasant both to taste and smell. Drinking such water is almost sure to produce disease, and this is one reason why marshy countries are unhealthy.

The presence of decomposing animal matter is still

more fatal. All animal waste matter is poisonous. The only safe place for it is underground, at a distance from tanks, wells, or other means of water supply. Drains and cesspits are the two great sources of contamination by animal poison, and these are the dangers against which it is necessary to take precautions. The fevers which are caused by drinking water poisoned with animal matter are not only dangerous while they last, but they leave the system debilitated for years after. The precautions necessary in this case are to keep the water as far away as possible from drains and cesspits, and to make liberal use of deodorising and disinfecting materials.

Water readily and speedily absorbs gases. It seems even more readily to absorb noxious gases, and thus to become dangerously impure. Water poisoned in this manner may not seem in any way unpleasant; it may appear as clear, sparkling, and agreeable as the purest, and yet it may contain the seeds of the most terrible diseases. As in the former case, the right course is to purify drains, disinfect cesspits, if they cannot be abolished altogether, and to draw the supply of drinking water from a source far away from both.

As regards the minute vegetable growths or germs which contaminate water imperceptibly, it is to be remarked that this source of disease is of so subtle a character as not to be easily detected or guarded against. Scientific men are not agreed on the subject, but the general opinion seems to be that the seeds of certain microscopic plants float about in the atmosphere, are taken up by water, and thus obtain entrance to the human body, in which they find the warmth and nourishment necessary for their growth and development. As they germinate, they rob the blood of its vital powers, and thus induce disease of the most fatal type.



When there is reason to suspect that the water in common use is impure, recourse may be had to two modes of purifying it—boiling and filtering. *All* water used for drinking purposes should be filtered; and a filter of sand and charcoal can be made by any intelligent person at a very low cost. Such a filter, besides separating from the water the poisonous matters before described, also removes what may be called mechanical impurities, mud, gravel, and even the larvae of insects and parasites, which, if they once obtain entrance into the body, would produce disease. But boiling the water is a still safer process. By boiling poisonous gases are driven out of the water and poison germs are killed. After boiling, the water should be exposed for a time to *fresh* air.

The particular disease which, in this country, is caused by bad water is typhoid fever, a complaint of a very dangerous character.

---

## LESSON XI.

### MONEY.

Quan-ti-ties.	Rep-re-sent-a-tive.	Ne-ces-si-ties.
Con-fu-sion.	Es-sen-tial-ly.	Leg-is-la-tors.
In-di-vid-u-al.	Re-bel-li-ons.	Ex-change-a-ble.

COPPER is useful as money; and as it is of less value, that is, more easily got, than gold and silver, it serves better for representing small quantities of other things, and thus aids in the exchange of such small quantities as, without it, would require the aid of very small pieces of gold or silver.

Since the value of a thing is what can be got in exchange for it, the value of money is the quantity of any other kind of goods which can be had in exchange for a

given amount in gold or silver coins. When we compare other things with these, we call the amount of the coins given for them the price. Thus, we may say, a shilling is the price of a pound of butter. Suppose now that two pounds of sugar are exchanged for a shilling, then it is clear that one pound of butter is equal in value to two pounds of sugar. Money, therefore, serves as a standard for measuring the values of all kinds of goods and services. Now, the sum of all the goods and services which a nation or an individual can command is called the wealth of that nation or individual; and thus we see that money is, on the one hand, a representative, and, on the other, a measure of wealth.

But money must not, in itself, be regarded as wealth. Wealth consists only of such kinds of goods and such kinds of services as can supply human wants; and in this sense, as much of the gold and silver in the world as exists in the shape of chains, watches, plate, and ornaments may be said to be wealth; but, in the form of money, gold and silver are essentially the representative and the measure of wealth. The measure of anything is not the thing itself. What measures cloth is not cloth; a clock is not time. Bread, meat, coals, sugar,—these are wealth; these supply our wants. But no man is fed by money, warmed or clothed with gold coins, nursed in his sickness by silver ones. The law makers of old times made serious mistakes through confounding money with wealth; and brought famines and rebellions into their country by passing laws which hindered gold from being taken out of it; and corn, and cloth, and other things which would have supplied the necessities of the people, from being brought into it. The legislators of Great Britain are wiser now; and laws have of late been framed under the just belief that it matters little whether there

be more or less money in the country, if the cupboards of the people contain bread enough, the larders meat enough, the presses cloth enough, and the cellars coal enough.

We must keep clearly in our minds the difference between the price and the value of a thing. We shall do this all the better, if we remember that there may be a general rise or fall in the prices of goods; but there cannot be a general rise or fall in their values. For the price of anything is the amount of gold or silver for which it can be exchanged; and its value is the amount of every other thing, taken singly, which it can be exchanged for. If half of all the gold and silver in the country were destroyed, other things remaining the same in quantity, all these other things would be exchanged in given quantities for only half of the gold and silver for which they were exchanged before; and thus there would be a general fall in the prices of them. If all the gold and silver in the country were doubled in amount, other things remaining the same, then all these other things would be exchanged in given quantities, for double the amount of the gold and silver for which they were previously exchanged; and thus there would be a general rise of prices.

But if half the existing quantity of everything exchangeable in the country, including gold and silver, were suddenly destroyed, then everything left would be exchanged in exactly the same quantity of one thing for the same quantity of another as before; and thus there would be no change of values. People would, in regard to all things, be only half as wealthy as before. The same thing, as regards values, would be true, if the quantity of everything exchangeable were suddenly doubled; only people would be twice as wealthy as before.

Although gold, silver, and copper are all used as money in Great Britain, gold forms what is called the standard coin of the country. People cannot, without confusion, have two different standards by which to measure anything, whether it be cloth, land, or wealth. It is not lawful to offer payment of large sums in anything but gold. For, if it were lawful to pay them in either gold or silver, then those who had large amounts to pay would pay them in silver when silver happened to be low in value, or in gold when it happened to be low. Some people think it would be an advantage to make it lawful to pay large amounts either in gold or silver as one pleased—that is, to have a double standard of value; but only the single standard, gold, is allowed. In Great Britain no man may pay more than forty shillings in silver, or more than five shillings in copper.

---

## LESSON XII.

## THE HERITAGE.

WHAT doth the poor man's son inherit?

Stout muscles and a sinewy heart,

A hardy frame, a hardier spirit;

King of two hands, he does his part

In every useful toil and art;—

A heritage, it seems to me,

A king might wish to hold in fee.

What doth the poor man's son inherit?

Wishes o'erjoyed with humble things.

A rank adjudged with toil-won merit,

Content that from employment springs

A heart that in his labour sings;—

A heritage, it seems to me,

A king might wish to hold in fee.

What doth the poor man's son inherit?  
A patience learned by being poor;  
Courage, if sorrow come, to bear it;  
A fellow-feeling that is sure  
To make the outcast bless his door;—  
A heritage, it seems to me,  
A king might wish to hold in fee.

O rich man's son! there is a toil  
That with all other level stands;  
Large charity doth never soil,  
But only whiten, soft white hands;—  
This is the best crop from thy lands;  
A heritage, it seems to me,  
Worth being rich to hold in fee.

O poor man's son! scorn not thy state;  
There is worse weariness than thine,  
In merely being rich and great:  
Toil only gives the soul to shine,  
And makes rest fragrant and benign;—  
A heritage, it seems to me,  
Worth being poor to hold in fee.

Both heirs to some six feet of sod,  
Are equal in the earth at last;  
Both children of the same great God,  
Prove title to your heirship vast  
By record of a well-filled past;—  
A heritage, it seems to me,  
Well worth a life to hold in fee.

## LESSON XIII.

## SEALS.

Ce-ta-ce-a.  
Am-phib-i-ous.  
At-mos-pher-ic.  
Dim-in-u-tive.

Or-din-ar-i-ly.  
Com-par-a-tive-ly.  
Es-sen-ti-al-ly.  
In-dif-fer-ent-ly.

Pres-er-va-tion.  
Gre-ga-ri-ous.  
In-tel-li-gence.  
Pos-te-ri-or.



AMONG the inhabitants of the ocean, none are more curious than those which, like the seals, possess a structure resembling that of land quadrupeds, although, like fishes, they live in the water, and find there the food necessary for their subsistence. These include, besides the seals, whales, dugongs, porpoises, dolphins, and others, all of which breathe atmospheric air, and, notwithstanding their aquatic mode of life, suckle their young. In these



two points, they differ essentially from fishes, which speedily die if removed from the water into the air, and which are wholly incapable of nourishing their young. By some writers, all the animals of the kinds just named are comprised in a class termed *Cetacea*, which denotes creatures of the whale kind. The seals, however, differ from the others of the class in being amphibious, that is, existing upon land or in the water indifferently; though, even in their case, immersion in the water is requisite for the preservation of health.

Seals, in the popular sense of the word, vary much in size, appearance, structure, and habits, from the enormous sea-elephant of the southern ocean to the comparatively diminutive common seal of northern latitudes. The former of these attains gigantic proportions, specimens having been seen measuring thirty feet in length and twenty in girth, which is about double the size of a large elephant. The common seal is usually not more than from four to six feet in length.

The difference in the appearance of various seals may be understood from the names given them by persons engaged in seal catching, or, as the occupation is more generally termed, the seal *fishery*. One variety, already mentioned, is called the *sea-elephant*; others, the *sea-lion* and the *sea-bear*; and a fourth is termed the *sea-horse*, though, in this case, it must be confessed with no great reason. The seal which frequents the Australian seas is commonly known as the *sea-leopard*.

As regards structure, seals are sometimes divided into two classes, those which possess external ears, and those which are destitute of these organs. Speaking generally, however, it may be said of the whole seal tribe, that the fore limbs are short and strong, and seem to be nearly hidden beneath the skin. The paws, although containing



five long fingers, are cased in a tough membrane so as to resemble fins; and they are ordinarily spoken of as *flippers*. Their principal use is for swimming, but they also assist the animal to seize its prey, and to travel on land or on ice. Still more powerful are the hind limbs, by means of which the seals move through the water with great rapidity, and turn in any direction at pleasure. In some instances the posterior limbs are directed forward, like those of land quadrupeds, when the animals are at rest; but they are always stretched backwards towards the tail in swimming. The body of the seal is of a conical shape, tapering from the chest to the tail. It is clothed with soft warm fur under thick compact hair, or with short smooth hair, firmly pressed to the skin and somewhat oily. Hence arises a common division of these animals into *fur* seals and *hair* seals.

The head is round with a large fleshy muzzle, which is studded with long stiff bristles. The eyes are large and dark, indicating much intelligence, and they are admirably fitted for seeing under water. In the different species, the teeth vary in number from thirty to thirty-six, and in some the canine teeth are excessively developed. Usually, seals have large brains, and are considered to possess an amount of intelligence approaching that of the dog. Their food is of a mixed description, and consists of fish, squids, and other marine animals, and, in some cases, of sea-weed. Beneath the skin is a layer of solid fat or blubber, which not only assists in retaining the bodily heat, but also renders the animal lighter and more buoyant in the water.

Seals, from their peculiar structure, are admirably adapted for their life in the sea; but on land they are awkward, and, when of large dimensions, ungainly. Still they manage to climb rocks and to ascend blocks of ice, and they have been known to travel many miles inland

from the shore. They visit the land for rest and sleep, for shelter from storms, and for the purpose of bringing forth and suckling their young. On such occasions, they are sometimes observed in immense numbers; in fact, from their gregarious habits, they are rarely met with unless in large herds.

The female is strongly attached to her young, defending them from danger, nursing them with care, and even teaching them to swim. Living as they do in the coldest parts of the earth, except when driven by an accident to more temperate regions, they are exposed to the attacks of the fierce white bear, and are hunted by the inhabitants for food. There is, therefore, great need for all their intelligence and caution to enable them to escape from such dangerous enemies.

The seal most commonly found upon the coasts of Australia is that called, from the colour and marking of its coat, the sea-leopard. Its home is probably in the Antarctic Ocean, from which it is driven by some unusual circumstance, and to which it returns after its visit to the warmer seas that encircle Australia. Very little is known of its habits.

Seals were formerly hunted for their skins, and for the oil extracted from their fat. The business of "sealing" is, however, now carried to but a comparatively slight extent in these colonies, though, while it lasted, the destruction of seals was enormous and wasteful.

## LESSON XIV.

## JAMES WATT.

Mis-er-a-ble.	Math-e-mat-ic-al.	Sci-en-tif-ic.
Ex-per-i-ments.	As-sid-u-ous-ly.	Me-chan-ic-al.
Prof-it-a-bly.	Char-ac-ter-is-tic.	En-er-get-ic.
Ge-o-met-ric-al.	Flex-i-bil-it-y.	Com-mod-it-y.

To the remarkable man whose name heads this lesson we owe, if not the invention, at least such improvements of the steam-engine as rendered it a machine of practical utility in manufacturing, mining, and other industries. In the hands of James Watt, the steam-engine, till then both clumsy and expensive, became the most useful, the cheapest, and the most effective means of applying power that the world has ever known.

James Watt was born at Greenock, a town in the west of Scotland, on the 19th January, 1736. As a child his constitution was delicate, and on that account he was unable to attend school regularly. Moreover, his disposition was so shy and sensitive that he was rendered completely miserable at school, and his attendance there proved to be of little benefit to him in any way. He was not idle, however, but read all the books that he could obtain, and thus acquired a much larger amount of knowledge than is usually possessed by boys. During this period of his life, his active mind was constantly engaged in observing; and he appears to have given much of his attention to steam, as far as it could be studied in his own home. Having noticed the steam issuing from his mother's tea-kettle, he commenced trying experiments upon its nature and properties. Sometimes he would take off the lid of the kettle, and watch the steam as it escaped; or he would hold a cup over the spout, and collect the vapour in order to see its condensation into drops of water.

His friends, supposing these acts to result from mere idleness or a spirit of mischief, reproved him for the waste of time, as they deemed it, not perceiving that he was really commencing a study by which he was, in the end, to rise to eminence as a man of science and a benefactor of mankind. He also manifested at a very early age a strong liking for mathematics. It is related that his father, being urged to send James to school that his time might not be wasted, pointed out that he was profitably engaged; and, on examining the child's work, it was found that, though only six years old, he was trying to solve some geometrical problem on the floor with a bit of chalk.

His father's business gave Watt an opportunity of becoming acquainted with various machines, as well as quadrants and other instruments used on board ship. In all these he took great interest; and at length, when eighteen years old, he was sent to London to learn the business of making mathematical instruments. He had received some little insight into the work from a teacher in Glasgow, but really knew but imperfectly the trade by which he was to gain a livelihood. But, in order to relieve his father from the cost of his maintenance, he worked so assiduously and lived so sparingly that his health, always delicate, entirely gave way; and after a year's residence in London, he was compelled to return to his native place. When his health had improved, he resolved to begin business as a mathematical instrument maker in Glasgow; and, having made good use of his opportunities in London, he was soon known as a workman well skilled in his art. But difficulties arose; and even after he had been appointed mathematical instrument maker to the Glasgow University, he found it no easy task to earn a living, although his habits continued to be of a very frugal kind. It was characteristic of Watt

that, at this time, he never refused any kind of work that he felt himself able to execute. He would construct an organ or mend a fiddle, although he had no ear for music; and, in order that he might perform such tasks faithfully and well, he undertook to study the scientific theory of music.

He continued in this position for several years, all the while studying various branches of science, and adding to his already large stock of knowledge. For these objects great facilities were now within his reach. The books and apparatus of the University, and intercourse with the professors, were turned to good account; and, in this way, Watt became known as an able man, a diligent student, and also a person of modest, obliging disposition.

In 1767, Watt was employed to make surveys for the construction of a canal, and to prepare estimates of the cost of the undertaking. He was thus introduced into a new and more lucrative employment than any he had yet followed. In the capacity of civil engineer he, from that time, secured frequent employment, chiefly in making surveys for canals, but also for deepening navigable rivers, and for improvements to harbours.

Watt had never entirely forgotten his early predilection for experimenting on steam, but it was not until the end of the year 1763 that the subject engaged his serious attention. At that time a working model of a Newcomen engine, belonging to the University, was placed in his hands for repair. The defect in the machine was speedily detected and easily remedied; but Watt, in performing the work, was convinced that Newcomen's engines were faulty in construction and principle, and that it was highly desirable to remove their imperfections. Although making use of steam, these engines were not, properly speaking, steam-engines, for steam was not the



motive power. They were, undoubtedly, the best of their kind; but in practice they were clumsy, wasteful, and therefore expensive. As a consequence they were little used, their chief employment being that of pumping water out of mines. Watt was at first content to improve the Newcomen engine, but finally determined to construct another to be moved by the expansive force of steam alone.

To prepare himself for the task he had undertaken, Watt read, studied, and experimented with the most sedulous care. For ten long years he laboured patiently to carry out his ideas, at one time sanguine of success, at another reduced almost to despair. At length success crowned his efforts. He discovered the means by which steam could be made a motive power, and the various mechanical contrivances by which the force thus created could be turned to useful account. But the inventor's difficulties were by no means at an end. Money was needed to make the new steam-engine practically available, and of this commodity Watt possessed but the very slenderest stock. After some disappointments, Watt met with Matthew Boulton, of Soho, near Birmingham, himself a manufacturer, and a man of intelligent mind and energetic character. With him Watt entered into partnership; and, by the manufacture and sale of steam-engines, both obtained handsome fortunes. There were troubles, no doubt, but they were gradually overcome, and Watt reaped the benefit of his long and weary years of patient thought, solitary toil, and unyielding perseverance.

Watt retired from active business at the beginning of the present century, but he did not, on that account, lead an idle life. Reading and study occupied much of his time, and he seemed to possess the power of learning



with ease and rapidity, though there is no doubt that his persistent industry was the chief cause of his success in intellectual pursuits. He died in 1819.

An able writer thus describes the steam-engine as it came from the hands of Watt :—"It has become a thing stupendous alike for its force and its flexibility ; for the prodigious power which it can exert, and the ease, and precision, and ductility with which it can be varied, distributed, and applied. The trunk of an elephant, that can pick up a pin or rend an oak, is as nothing to it. It can engrave a seal, and crush obdurate masses of metal before it; draw out, without breaking, a thread as fine as gossamer; and lift a ship of war like a bauble in the air. It can embroider muslin and forge anchors, cut steel into ribbons, and impel loaded vessels against the fury of the winds and waves."

---

### LESSON XV.

#### A DAY IN AN ENGLISH COAL-PIT.

Im-pris-oned	Oc-ca-sion-al-ly.	Ex-tin-guish-er.
Con-stant-ly	Prep-ar-a-tions.	Ven-til-ate.
Pas-sa-ges.	Pos-sib-ly.	Deaf-en-ing.
Gal-lop-ing	Hal-low-ing.	Con-nect-ed.

A COAL-PIT is the place underground where coals are dug out by the colliers, or "pit-men." They enter the pit by a deep hole or *shaft*, something like a large well, but much deeper. Many pits are from 300 to 400 yards deep. The colliers are let down and drawn up in large tubs, or *cages*, fastened to strong ropes, and these are wound up and unwound on a wheel worked by a steam-engine. It is so arranged, that while one lot of tubs goes down another comes up. All through the day the

engine is drawing up large tubs, or trucks, filled with coals.

Once I went down into a coal-pit. I stepped into the cage between two colliers, and then we began to descend. Down and down we went, and it grew darker and darker, and the mouth of the pit overhead seemed to get smaller and smaller. It was a time of terror to me. But there was no going back now; so I spoke out bravely, and seemed not to care. At last the cage touched the bottom, and out we stepped, each one taking a lamp in his hand, with a wire-gauze all around it. This is called a Davy Lamp, or Safety Lamp. It gives a very dim light, but it prevents explosions, which are apt to take place when a naked light is carried through a coal-pit, on account of the gas, called *fire-damp*, which sometimes escapes from the coals.

This is not the only danger, I was told, to which the poor pitmen are exposed. Sometimes a mass of rock will fall, and block up the passages, and keep them for hours and even days imprisoned. Or, what is still worse, water will often burst in from springs in the rocks, and drown them before they have had time to escape. Occasionally, a pit takes fire, and the flames may be seen high up above the mouth of the shaft. Then, of course, no one can possibly escape until the fire is put out, and by the time this is done most likely all below have perished. To check the fire when a pit is in flames, the shaft is closed up tight, so that no air can get in; and then the fire dies out, just as a candle goes out when an extinguisher is put over it.

Hearing of all these dangers as I went along the passages, I wished myself safe out again. At last, on turning a corner and passing through a door, I was surprised to find myself in an under-ground stable. By the oil-lamps

in the stable I could at length see a row of small ponies not so tall as a donkey. I counted fifty-five of them. I saw them fed and watered. A truck ran on rails at the back of the ponies, so that all the man had to do was to take out a basket of beans and chaff as he came to each one. Then another man filled a tub with water from a cistern in the wall, and pushed it on a truck after the other. Each pony turned round and drank as the tub came to him. The stable-men told us that some of the ponies had been in the pit for years, and others only for days. One little grey pony had been there for ten years; in fact, he was born there, so that he had never seen daylight.

On leaving the stable we threaded our way through a host of narrow passages, scarcely high enough for a man to walk upright in, and very jagged at the top and sides, where the coal had been dug out. Along the ground were lines of rails, on which constantly passed rows of trucks laden with coal, making their way to the shaft, and being drawn along by a rope connected with the engine at the mouth of the pit. After walking about two miles, and creeping for about two hundred yards, holding on by my guide's coat-tails, I came at last where the men were at work.

Eight men were at work in the part I had come to. Three of them sat down, and with small pick-axes began to dig away at the seam of coal in front of them, which was about five feet thick. The only light they had was the small Davy Lamp hung to a nail. The poor fellows' limbs must have got very cramped, after working in that way a few hours, for they had but little room to move their arms and swing their picks. After hollowing out the coal for a few feet inwards, props were set up to keep the roof from falling in. Tubs were filled with the coal dug out, and then a small boy with a very small pony came whistling up to the spot, and drew away a dozen

tubs of coal, and presently returned with a dozen empty ones. He came up galloping, lying flat on the pony's back, so as not to bump his head against the roof.

When the men had dug out quite a little cavern in the coal, preparations were made for *blasting*. A hole was bored in the coal, about a yard deep, at the back of the cavern, and into this was placed a packet of *blast-powder*. A kind of cord, called a *fuse*, about a yard long, is attached to this packet. The fuse is made of stuff that will burn slowly. The end of the fuse was then lighted, and while it was slowly burning towards the powder, we hastened off to a place of safety. Presently a deafening noise was heard, like thunder. On going back we found huge masses of coal had been brought down by the shock.

I was then taken to another part of the pit. The way was so narrow, that we could not pass a lot of loaded trucks that were waiting to be drawn up the shaft. I saw our leader pull a wire which ran along one side of the wall, and in a few minutes the trucks began to move. The wire went to the engine-house above ground, and rang a bell. On hearing this the engine-driver turned a handle, and then the rope to which the trucks were fastened was wound up on a large wheel by the force of the engine, and thus they were drawn up to the top of the shaft.

After going a little farther, the wind was so strong that it blew my hat off, and my lamp out. My guide told me I ought to have held the lamp right against my breast, that the wind might not pass through it. I wondered where the wind came from, but I was afterwards informed that it is pumped into the pit by an engine to ventilate it—to drive out the bad air, and supply the colliers with pure air. I had no sooner turned round to find my hat, which had been blown off, than a loud rumbling noise reached my ears. This, I was told by my

guide, was a train of empty trucks coming down *the plane*, or slope; and he instantly began to run, followed by me holding on to his coat-tails. After running about twenty yards, we came to a hollow place cut out in the coal, and there we stood while the train rushed by us. In passing on, I afterwards noticed many of these recesses, and sometimes small cabins, where the men leave their coats, and where the ponies will hide after running away from the boys. I was told that the ponies born underground give the greatest trouble by playing hide-and-seek with their young drivers.

At last we reached the foot of the shaft, and, after ringing a bell as a signal to the engine-driver, we were drawn up slowly into the glorious sunlight. I went into the engine-house to change my dress, and on looking at the notice-board, I found that 500 men were at work below, and 700 tons had been brought up that day.

---

## LESSON XVI.

### THE SAXONS.

A-ban-doned.	Bar-ba-ri-ans.	Re-lig-i-on.
Quar-relled.	Pi-rat-ic-al.	For-eign-ers.
Mu-tu-al.	Ex-pe-di-tions.	Per-suad-ed.
Des-per-ate.	Des-ig-na-ted.	Con-quer-ors.

AFTER the departure of the Romans, the country was frequently invaded by the Picts who treated the unfortunate Britons with great cruelty. Appeals for help against the northern barbarians were made to the Romans; but at this time Rome herself was pressed by her enemies, and could spare none of her soldiers to assist the people she had abandoned. Moreover, the Britons, instead of uniting for mutual defence against the invaders, quarrelled



among themselves, and chose numerous petty chieftains for their rulers. These, striving for the mastery of the country, cared little about the incursions of the Picts, or the sufferings of the people they were bound to protect. Old writers tell us that rumours of a new and more terrible invasion of the Picts having come to the ears of the Britons, their chiefs assembled and resolved to seek help from a fierce and warlike race, called Saxons.

The Britons had already learned something of the fighting qualities of the Saxons who, for more than a century, had sent piratical expeditions against the eastern coast of Britain, and had even made settlements in various places. It was known that they fought with desperate valour, and hence it was inferred that they could succeed in driving the Picts back to their mountains in the north.

The native land of the Saxons lay along the shore of the North Sea from Denmark to Holland, and included the country around the lower courses of the Elbe, Weser, Ems, and Rhine. They belonged to the same race as the Danes, but were also near of kin to the neighbouring German tribes. There were three tribes of Saxons, or, as they all called themselves, English. The first were the Jutes, who lived farthest north in the country now called Denmark. South of them, in Schleswig and Holstein, dwelt the Angles; and southernmost of all were the Saxons, who inhabited Hanover and Friesland. Although they designated themselves and their language English, they are commonly spoken of as Saxons or Anglo-Saxons, for by this name they were known to the Britons. In like manner, the Saxons styled the Britons "Welsh," that is, *foreigners*.

The Saxons or English were not an utterly barbarous people in their own country. They had good laws and a settled form of government. Great respect was shown to



women, and children were more kindly treated than by the Britons, or even by the Romans. They were industrious, skilful in many kinds of handicraft, and were generally well clothed. But they were warlike and often fought with their neighbours in Germany and Denmark. When not otherwise engaged, they were accustomed to embark in their ships and sail around the coasts of the North Sea, plundering the towns and villages that were unable to resist their attacks. In this course they were encouraged by the nature of their religion. At this time they were heathens and worshipped a number of false gods, after whom some of the days of the week are named. Such are Tuesday, Wednesday, Thursday, Friday, and Saturday.

A band of Jutes, under the command of two leaders named Hengist and Horsa, having made their appearance upon the coast of Kent for the purpose of plunder, the British prince Vortigern invited them to remain and assist him against a rival, or against the Picts, for historians are not agreed upon this point. The result was, however, that after some fighting, and with the assistance of some of their countrymen, the Jutes obtained and kept possession of Kent. This happened in the year 451.

About twenty-five years afterwards, a band of Saxons landed on the southern coast of Britain, and having defeated the Britons, established a second kingdom, known as that of the South Saxons, or Sussex. Then followed a second invasion of Saxons, who founded the kingdom of Wessex, or that of the West Saxons. While these were conquering the Britons in the west and enlarging their own territories, the Angles established themselves on the east coast, where they founded three kingdoms. Other Saxons followed, until the whole of England and the south-east of Scotland passed out of the hands of the Britons, with

some exceptions that will be mentioned hereafter. It must not be supposed, however, that the Saxons gained their conquests easily or speedily. The Britons fought bravely and stubbornly; and, if they could have been persuaded to act unitedly, the result might have been different. As it was, the Saxons were occupied for more than 150 years in the task of subduing the Britons and seizing their lands. At the end of that period, there were established in the island a number of Anglo-Saxon kingdoms—at first eight or nine, but afterwards seven. These are often spoken of in history as the Saxon Heptarchy. The portions of the country retained by the Britons were the north-west of England and the south-west of Scotland, Wales, and Devon and Cornwall.

In the course of the long wars which preceded this settlement, great numbers of the Britons were killed, for the Saxons were rarely disposed to be merciful in the battle-field; others emigrated to Gaul and to other countries, to escape from their pagan enemies; and many retired into Wales and the other British kingdoms. But a large proportion of the poorer Britons must have been held in subjection by the Saxons as slaves, and in course of time became incorporated with their conquerors. The Saxon speech became the language of England, and the Saxon people may properly from that time be called English, the Britons being known as Welsh.



## LESSON XVII.

## THE COMPASS.

Mag-ne-si-a.  
Ar-ti-fic-i-al.  
Gen-er-al-ly.

In-ten-sit-y  
Un-fre-quent-ly.  
Val-u-a-ble.

Del-ic-ate-ly.  
Dif-fic-ul-ty  
Ac-cu-rate-ly.

HAVE you ever thought how ships are guided when no land is to be seen? How is the sailor able to pursue his pathless way, for weeks together, over the world of waters, with nothing but sea and sky around him? Now this wonder, for wonder it is though so common, is performed by the aid of a small steel bar, under the name of a magnet.

Long ago there was found in Asia Minor a particular kind of iron ore. This ore had the strange quality of attracting, or drawing towards itself, pieces of iron or steel. As this ore was largely found near the town of Magnesia, pieces of it, used for showing this drawing or attractive force, were called *magnets*.

Of course, these pieces formed *natural* magnets. By-and-by it was discovered that, by rubbing bars of iron or steel with these natural magnets, we could make artificial ones. These are the magnets always used; they can be made of almost any shape or size. Magnets are generally either in straight bars, or bent round into a horse-shoe form. The reason for bending the bar round like the letter U is to make both ends touch the same thing.

A pretty way to show the attraction of iron for magnets, is to plunge a bar magnet into iron filings. Roll your magnet well about in the filings, and notice how they cluster round it in groups. You may notice, too, that the greatest quantity of iron filings hangs near the two ends. There is very little round the middle of the bar.

These points where the magnet seems to have the most power are called its *poles*. These poles have nothing whatever to do with scaffold poles. The poles of a magnet are simply its points of greatest intensity, the spots where the magnet has its greatest force. One of these is called the north pole, and the other the south pole. The north pole is generally marked with the letter N, or with a notch. It is not unfrequently called the marked end of the magnet.

Magnets, besides the curious power they have of drawing iron to them, have another, and a very useful quality. This is the quality of pointing in *one direction*. Suppose a bar magnet to be nicely balanced upon a point. Let it be free to move round any way it pleases. It will be found to point always in one certain direction. Pull it away from this direction as much as you will, it will finally return to it, after many indignant shakes. This is a quality of the magnet that you can rely on. It is this steady looking at one point which makes the magnet so valuable as a guide.

Since one end of the magnet (the marked end) points somewhat towards the north pole, the other end represents, of course, the reverse, that is, the south pole. Then, at right angles from this line, you have east and west. Thus, by securing a fixed point, the others are easily ascertained.

Now you are prepared to understand the principle of the compass. It is called, generally, the "Mariners' or Sailors' Compass," from its being so necessary to mariners.

A compass consists of two chief parts, the magnet and the card. The magnet is usually a flat polished bar of steel, properly made into a magnet. Being delicately balanced on its centre, it is free to move as it wishes. This is generally called the "needle," from sometimes

being narrow and tapering at its ends. The card beneath the magnet has a circle drawn on it. This circle is divided into thirty-two parts, called "points of the compass." There are, first of all, the four great points—north, south, east, and west; these are also called the *cardinal* or chief points; and between these cardinal points are various other points or directions.

The point half-way between any two cardinal points is named after both its parents. Thus, half-way between north and east is called north-east. Again, half-way between north and north-east is termed north-north-east, formed by adding the two names together.

Supposing the compass lost its magic power for a single day, what destruction and misery would be the consequence! When iron ships came into use a difficulty was felt—you now know why. The compasses have to be carefully tested before going to sea, and most ships are provided with several—one being fixed aloft, to be beyond the influence of the iron.

The origin of the compass is not accurately known. The same may be said of many other great discoveries, such as that of the telescope. The Chinese knew of, and used the compass long before Europeans thought of it.

Before compasses came into use, sailors hardly dared to trust themselves far from the sight of land. The stars were their guides then, as indeed they still are to a certain extent.

---

### LESSON XVIII.

#### THE SONG OF STEAM.

HARNESS me down with your iron bands,  
Be sure of your curb and rein;  
For I scorn the power of your puny hands  
As the tempest scorns a chain.

How I laughed, as I lay concealed from sight  
For many a countless hour,  
At the childish boast of human might,  
And the pride of human power !

When I saw an army upon the land,  
A navy upon the seas,  
Creeping along, a snail-like band,  
Or waiting the wayward breeze ;  
When I marked the peasant faintly reel  
With the toil which he daily bore,  
As he feebly turned at the tardy wheel,  
Or tugged at the weary oar ;

When I measured the panting courser's speed,  
The flight of the carrier dove,  
As they bore the law a king decreed,  
Or the lines of impatient love ;  
I could not but think how the world would feel,  
As these were outstripped afar,  
When I should be bound to the rushing keel,  
Or chained to the flying car.

Ha ! ha ! ha ! they found me at last ;  
They invited me forth at length,  
And I rushed to my throne with thunder blast,  
And laughed in my iron strength.  
Oh ! then ye saw a wondrous change  
On the earth and ocean wide,  
Where now my fiery armies range,  
Nor wait for wind or tide.

Hurrah ! hurrah ! the waters o'er  
The mountains steep decline ;  
Time—space—have yielded to my power—  
The world ! the world is mine !  
The rivers the sun hath earliest blest,  
Or those where his beams decline,  
The giant streams of the queenly West,  
Or the orient floods divine.



The ocean pales where'er I sweep,  
To hear my strength rejoice ;  
And the monsters of the briny deep  
Cower, trembling, at my voice.  
I carry the wealth and the lord of earth,  
The thoughts of the god-like mind ;  
The wind lags after my flying forth,  
The lightning is left behind.

In the darksome depths of the fathomless mine  
My tireless arm doth play,  
Where the rocks never saw the sun decline,  
Or the dawn of the glorious day.  
I bring earth's glittering jewels up  
From the hidden cave below ;  
And I make the fountain's granite cup  
With a crystal gush o'erflow.

I blow the bellows, I forge the steel,  
In all the shops of trade ;  
I hammer the ore, and turn the wheel,  
Where my arms of strength are made ,  
I manage the furnace, the mill, the mint ;  
I carry, I spin, I weave ;  
And all my doings I put into print  
On every Saturday eve.

I've no muscle to weary, no breast to decay,  
No bones to be "laid on the shelf,"  
And soon I intend you may "go and play,"  
While I manage the world by myself.  
But harness me down with your iron bands,  
Be sure of your curb and rein ;  
For I scorn the strength of your puny hands,  
As the tempest scorns a chain.

## LESSON XIX.

## THE MUTINY OF THE "BOUNTY."

— Un-in-ter-rupt-ed.	Pros-per-it-y.	Vi-o-lence.
— Im-me-di-ate-ly.	Bo-ha-vi-our.	En-deav-our.
— Mel-an-chol-y.	Cer-c-mo-ny.	Kind-ness-es.
— Sat-is-fac-tion.	Nav-i-ga-tion.	Im-ag-ined.

CAPTAIN BLIGH having been sent out by King George III. to establish friendly relations with the Otaheitan king, entirely succeeded in his mission; and was returning with a cargo of bread-fruit when the following incident took place.

On the 27th April 1787, Captain Bligh found himself between the islands Tofoaa and Kotoo, advancing in a course of uninterrupted prosperity, and attended with circumstances in the highest degree pleasing. On leaving the deck at night, he gave directions as to the course to be steered; the master had the first watch, the gunner the middle one, and Mr. Christian that of the morning.

But just before sun-rise on the 28th, while he was yet asleep, the last named officer, Charles Churchill, ship's corporal, John Mills, gunner's mate, and Thomas Barkitt, seaman, went into his cabin, and, seizing him, tied his hands with a cord behind his back, threatening him with instant death if he spoke or made the least noise. He called, however, as loud as he could, in the hope of finding assistance; but they had already secured the officers who were not of their party, by placing sentinels at their doors. Christian had only a cutlass in his hand, the others had muskets and bayonets. They hauled him out of bed, forcing him on deck in his shirt, suffering great pain, says he, "from the tightness with which they had tied my hands. I demanded the reason of such violence,

but received no other answer than abuse for not holding my tongue."

The boatswain was ordered to hoist the launch out, with a threat, if he did not do it instantly, of severe measures. When the boat was out, Mr. Hayward and Mr. Hallet, two of the midshipmen, and another person, were commanded to descend into it. The commander desired to know the cause of such behaviour, and tried to persuade the people near him not to persist in such acts of violence; but the only answer he received was, "Hold your tongue, sir, or you are dead this instant." Mr. Bligh states in his narrative that he continued his endeavours to turn the tide of affairs, when Christian changed the cutlass which he had first drawn for a bayonet that was brought to him, "and holding me with a strong gripe by the cord that tied my hands, he threatened to kill me immediately if I would not be quiet: the villains round me had their pieces cocked and their bayonets fixed."

"Particular persons were called to go into the boat, and were hurried over the side of the vessel; whence I concluded that with these people I was to be set adrift. I therefore made another effort to bring about a change, but with no other effect than to be threatened to have my brains blown out." The boatswain and seamen who were to go in the boat were allowed to collect twine, canvas, lines, sails, cordage, with a cask of water containing twenty-eight gallons; and the clerk got one hundred and fifty pounds of bread, with a small quantity of rum and wine, and also a compass; but he was forbidden on pain of death to touch either map, chart, or any surveys or drawings.

The officers and men being in the boat, Mr. Christian, the chief mutineer, advanced to his prisoner, and said, "Come, Captain Bligh, your officers and men are now in the boat, and you must go with them. If you attempt

to make the least resistance, you will instantly be put to death." Without further ceremony he was forced over the side, when they untied his hands; and the small barque being drawn astern by a rope, the party, amounting in all to nineteen individuals, were immediately cast loose in the open ocean.

"Notwithstanding the roughness with which I was treated," says the commander, "the remembrance of past kindnesses produced some signs of remorse in Christian. When they were forcing me out of the ship, I asked him if this treatment was a proper return for the many instances he had received of my friendship? He appeared disturbed at my question, and answered with much emotion, 'That, Captain Bligh—that is the thing!'"

After he was turned adrift with his eighteen companions in distress, they heard a shout on board, several times repeated, "Huzza for Otaheite!" Now, the chiefs were so much attached to our people that they had encouraged their stay among them, and had even made them promises of large possessions. Under these and many other attendant circumstances, it is not perhaps much to be wondered at, though scarcely possible to have been foreseen, that a set of sailors, most of them having no relations at home who could engage their thoughts, should have been led away; especially when, in addition to such powerful inducements, they imagined it in their power to fix themselves in the midst of plenty on one of the finest islands in the world, where, without any labour, the comforts of life are beyond anything that can be conceived.

The most wonderful occurrence in the history of this mutiny, is the navigation in the open boat from the Friendly Islands to Timor, in the Indian Ocean, a distance of above four thousand miles, with hardly enough of food to keep the people alive. On the 5th of June, a

booby was caught by the hand, the blood of which was divided among three of the men who were the weakest, and the bird kept for next day's dinner.

On the 7th, after a miserably wet and cold night, the sea, which was running high, broke over the boat the whole day. Mr. Ledward, the surgeon, and Lawrence Lebogue, a hardy old seaman, appeared to be giving way very fast. No other assistance could be given to them besides a teaspoonful or two of wine, which had been carefully saved for such a melancholy occasion. On the morning of the 10th, there was a visible alteration for the worse in many of the crew. An extreme weakness, swelled legs, hollow and ghastly countenances, a more than common inclination to sleep, with loss of memory, seemed the melancholy presages of approaching death.

On the 11th, Mr. Bligh announced to his wretched companions, that he had no doubt they had now passed the south of the eastern part of Timor, a piece of intelligence which diffused universal joy and satisfaction. Accordingly, at three in the morning of the following day, the island was discovered at the distance of only two leagues. "It is not possible for me," says the captain, "to describe the pleasure which the blessing of the sight of this island diffused among us. It appeared scarcely credible to ourselves, that, in an open boat and so poorly provided, we should have been able to reach the coast of Timor in forty-one days after leaving Tofoaa, having in that time run, by our reckoning, about three thousand six hundred and eighteen nautical miles; and that, notwithstanding our extreme distress, no one should have perished in the voyage."

## LESSON XX.

## PRESENCE OF MIND.

Ob-liv-i-ous-ness.  
 Ac-cid-ent-al-ly.  
 In-dis-crim-in-ate.  
 Mol-es-ta-tion.

In-con-ve-ni-ent.  
 Pre-cip-it-a-ted.  
 In-ad-ver-tent-ly.  
 In-ter-fe-rence.

In-ju-ri-ous.  
 Rid-ic-u-lous.  
 Bus-in-ess-like.  
 Cal-cu-la-ted.

SOME persons, in their ordinary conduct, appear to forget what they are doing, or what they are required to do, and thus are led into acting in a wrong or ludicrous manner. This state of obliviousness is called *absence of mind*, and causes inconvenient and even injurious results to those who indulge in it, besides making them appear ridiculous in the eyes of other people. The habit of talking to one's self aloud is an example of absence of mind.

But persons who are not subject to this weakness sometimes fail to manifest the opposite good quality. In all ordinary affairs of life, they act in a sensible, business-like manner, as if they understood what was necessary or proper under the circumstances. But if a difficulty or danger suddenly come in their way, they become confused, they lose the power of thinking or acting with judgment, and often do the very thing they would not do if they had time to consider. Such persons are said *to lose their presence of mind*. On the other hand, instances are recorded in which great judgment was exhibited in deciding what ought to be done on the instant under circumstances calculated to create alarm and confusion of thought. In these cases, we say that the individuals concerned showed great presence of mind.

This faculty of seeing at once what is the right course to pursue in time of danger or difficulty is a valuable



gift. It is sometimes allied with great courage, and then becomes a means of effecting much good and even of saving life. But it also demands the possession of a certain amount of knowledge, without which proper action could not be taken in some cases. The following occurrence illustrates this statement. A man working at a saw-mill accidentally brought his right hand into contact with a revolving saw. The hand was nearly sawn through, and the wound bled profusely. No medical assistance could be procured, and there was danger that the man would bleed to death, or at least faint from loss of blood. The people around were most anxious to assist, but they were bewildered and failed to render any effectual help. Some proposed one thing, some another; but the only approach towards useful interference consisted in wrapping the wounded hand in a handkerchief. Fortunately, a person happened to pass whose knowledge was somewhat greater than that possessed by the others, and he immediately made a long bandage out of a handkerchief, and tied it round the injured man's arm above the elbow, as tightly as he could bear it. This, in a great measure, stopped the bleeding, and enabled the man's friends to convey him to an hospital.

Another example of the effect of presence of mind combined with superior knowledge, is afforded by the conduct of a little girl at school. The schoolhouse was constructed of wood, and one day an alarm was raised that it was on fire. A panic seized the children, who with screams of terror rushed to the door and down the stairs, all but one little girl, who sat still in her seat, anxious indeed, but collected. The fugitives in their flight crushed and injured each other, and some were precipitated violently down the stairs. The alarm proved to be false, and when order was restored, little Mary, as

we will call her, was asked why she had not joined her schoolfellows in their headlong flight from supposed danger. She replied that her father, who was a fireman, had taught her that the safest course when a large number of persons were collected in a building believed to be on fire, was for all to sit still and allow those nearest the door to leave the room first and the others in orderly succession, by which plan all could escape more quickly than by an indiscriminate rush.

Presence of mind has often been of use in saving life. A very simple example is supplied by an incident that occurred in India. A lady walking near a jungle, was horrified to see an immense tiger coming out of it to meet her. Advance or retreat seemed equally dangerous; and the poor lady was about to give herself up as lost, when it fortunately occurred to her to open her parasol suddenly and thrust it in the tiger's face. The device succeeded, for the tiger, surprised at the sudden appearance of the parasol, rushed back into the jungle, and left the lady to find her way home without molestation.

Many instances have been recorded in which property, as well as life, has been preserved through presence of mind. During the Crimean war, a bomb-shell from the Russian batteries fell upon the deck of a British man-of-war, and rolled towards the magazine. An officer knowing that, if allowed to remain, it would injure if not wholly destroy the ship and crew, had the presence of mind to seize the shell and throw it overboard. It then harmlessly exploded in the water.

The last, but not the least, use of presence of mind now to be mentioned is its prevention of pain to the feelings of others. An illustration will render this clear. A great king, who had the reputation of being also a gentleman, had commenced the narration of a story to his as-

sembled courtiers, when he suddenly noticed among them a person who would have been pained by continuing the tale. He therefore broke off the narrative in an abrupt way, preferring to be considered a bad story-teller than as unmindful of the feelings of others. If, in the words of a poet, "a small unkindness is a great offence;" and if, as another poet affirms, "evil is wrought by want of thought," we should be especially careful about our common talk, that we may not inadvertently cause pain or annoyance to those we converse with by our random speaking. In no particular is presence of mind more conspicuous or more to be valued than in the government of the tongue.

---

## LESSON XXI.

### A LION HUNT.

**Ren-dex-vous**  
**Hot-ten-tots.**  
**Lu-dic-rous.**  
**Dis-tin-guished.**

**In-ex-pe-ri-enced.**  
**Ter-rit-o-ry.**  
**Ac-cord-ing-ly**  
**Act-u-al-ly.**

**De-lib-er-ate.**  
**Mag-nif-i-cent.**  
**As-cer-tain-ing.**  
**Med-it-a-ting.**

ONE night a lion that had purloined a few sheep out of my kraal, came down and killed my riding horse, about a hundred yards from the door of my cabin. Knowing that the lion, when he does not carry off his prey, usually conceals himself in the vicinity, and is very apt to be dangerous by prowling about the place in search of more game, I resolved to have him destroyed or dislodged without delay. I therefore sent a messenger round to invite all who were willing to assist in the enterprise, to repair to the place of rendezvous as speedily as possible. In an hour every man of the party appeared, ready mounted and armed. We were also reinforced by about a dozen of the Hottentots, who resided at that time upon

our territory as tenants or herdsmen—an active and enterprising, though rather an unsteady race of men. Our friends the Turka Boors, many of whom are excellent lion hunters, were all far too distant to assist us, our nearest neighbours residing at least twenty miles from the location. We were, therefore, on account of our own inexperience, obliged to make our Hottentots the leaders of the chase.

The first point was to track the lion to his covert. This was effected by a few of the Hottentots on foot. Commencing from the spot where the horse was killed, they followed the *spoor*, through grass, and gravel, and brushwood, with astonishing ease and dexterity, where an inexperienced eye could discern neither footprint nor mark of any kind, until at length we fairly tracked him into a large *bosch*, or straggling thicket of brushwood and evergreens, about a mile distant.

The next object was to drive him out of this retreat, in order to attack him in a close body, and with more safety and effect. The approved mode in such cases is to torment him with dogs till he abandons his covert, and stands at bay in the open plain. The whole band of hunters then march forward together, and fire deliberately one by one. If he does not speedily fall, but grows angry and turns upon his enemies, they must then stand close in a circle, and turn their horses rear outwards. The horses are held fast by the bridles, while the riflemen kneel to take a steady aim at the lion as he approaches. Sometimes he comes up to the very horses' heels, couching every now and then, as if to measure the distance and strength of his enemies.

This is the moment to shoot him fairly in the forehead, or some other mortal part. If they continue to wound him ineffectually, till he waxes furious and desperate, or

if the horses, startled by his terrific roar, grow frantic with terror, and burst loose, the business becomes rather serious, and may end in mischief; especially if all the party are not men of courage, coolness, and experience. The frontier Boors are, however, generally such excellent marksmen, and withal so cool and deliberate, that they seldom fail to shoot him dead as soon as they get within a fair distance.



In the present instance we did not manage matters quite so deliberately. The Hottentots, after recounting to us all these and other sage laws of lion hunting, were themselves the first to depart from them. Finding that the few indifferent hounds which we had made little im-



pression on the enemy, they divided themselves into two or three parties, and rode round the jungle, firing into the spot where the dogs were barking round him, but without effect.

At length, after some hours spent in thus beating about the bush, the Scottish blood of some of my countrymen began to get impatient; and three of them announced their determination to march in and beard the lion in his den, provided three of the Hottentots (who were superior marksmen) would support them, and follow up their fire, should the enemy venture to give battle. Accordingly in they went (in spite of the warnings of some more prudent men among us) to within fifteen or twenty paces of the spot where the animal lay concealed. He was couched among the roots of a large evergreen bush, with a small space of open ground on one side of it; and they fancied, on approaching, that they saw him distinctly lying glaring at them from beneath the foliage. Charging the Hottentots to stand firm and level fair should they miss, the Scottish champions let fly together, and struck, not the lion, as it afterwards proved, but a great block of red stone, beyond which he was actually lying. Whether any of the shot grazed him is uncertain, but with no other warning than a furious growl, forth he bolted from the bush.

The Hottentots, in place of now pouring in their volley upon him, instantly turned and fled, helter-skelter, leaving him to do his pleasure upon the defenceless Scots; who, with empty guns, were tumbling over each other, in their hurry to escape the clutch of the rampant savage. In a twinkling he was upon them, and with one stroke of his paw dashed the nearest to the ground. The scene was terrific! There stood the lion, with his paw upon his prostrate foe, looking round in conscious power and



pride upon the bands of his assailants, and with a port the most noble and imposing that can be conceived. It was the most magnificent thing I ever witnessed.

The danger of our friends, however, rendered it at the moment too terrible to enjoy either the grand or the ludicrous part of the picture. We expected every instant to see one or more of them torn in pieces; nor, though the rest of the party were standing within fifty paces with their guns cocked and levelled, durst we fire for their assistance. One was lying under the lion's paw, and the others scrambling towards us in such a way as to intercept our aim at him.

All this passed far more rapidly than I have described it. But luckily the lion, after steadily surveying us for a few seconds, seemed willing to be quits with us on fair terms; and with a fortunate forbearance (for which he met but an ungrateful recompense) turned calmly away, and driving the snarling dogs like rats from among his heels, bounded over the adjoining thicket like a cat over a footstool, clearing brakes and bushes, twelve or fifteen feet high, as readily as if they had been tufts of grass, and abandoning the jungle, retreated towards the mountains.

After ascertaining the state of our rescued comrade (who, fortunately, had sustained no other injury than a slight scratch on the back, and a severe bruise in the ribs, from the force with which the animal had dashed him to the ground), we renewed the chase, with Hottentots and hounds in full cry. In a short time we again came up with the enemy, and found him standing at bay under an old mimosa tree, by the side of a mountain stream, which we had distinguished by the name of Douglas Water.

The dogs were barking round, but afraid to approach

him, for he was now beginning to growl fiercely, and to brandish his tail in a manner that showed he was meditating mischief. The Hottentots, by taking a circuit between him and the mountain, crossed the stream, and took a position on the top of a precipice overlooking the spot where he stood. Another party of us occupied a position on the other side of the glen; and placing the poor fellow thus between two fires, which confused his attention and prevented his retreat, we kept battering away at him till he fell, unable again to grapple with us, pierced with many wounds.

He proved to be a full-grown lion of the yellow variety, about five or six years of age. He measured nearly twelve feet from the nose to the tip of the tail. His fore leg, below the knee, was so thick that I could not span it with both hands; and his neck, breast, and limbs appeared, when the skin was taken off, a complete mass of sinews.

---

## LESSON XXII.

### THE HOUSE FLY.

Myr-i-ad.	Ac-tiv-it-ies.	Mi-cro-scope.
Scav-en-gers.	Pest-il-en-ces.	Grav-it-a-tion.
Sci-en-tif-ic.	An-at-o-my.	Pro-bos-cis.
Cat-er-pil-lar.	Ir-sig-nif-i-cant.	Com-plex-it-y.

TREATED much in the same manner as the pariah dogs of the East, flies are yet in their myriad winged activities no less the scavengers of the air than those despised quadrupeds are of the earth, and happy may it be for ourselves that we see not the reverse of the picture at which we rail, nor find ourselves in some sad hour, when the spider proves too many for the fly, surrounded by

the odours, the miasma, and the pestilences from which the presence of the fly relieves us.

Though to make friends with a fly were a vain attempt, we may yet bring it to terms of very close acquaintance, and under the friendly light of the microscope, discover that it is, in its anatomy, one of the most interesting objects of scientific research.

That they are designed to fulfil no insignificant part in nature may be gathered from the fact, that from one mother not less than twenty thousand living sons and daughters are known to have descended.

Between the early life of the fly in its caterpillar form and its subsequent aerial existence, there seems to be less connection than between the earlier and later life of any other insect.

There is no point of resemblance, either in outward form or in inward structure, between the white, soft, pulpy, eyeless, and legless body, which has twisted and wriggled through its blind career, and the restless, buzzing tormentor which dances merrily in the sunshine.

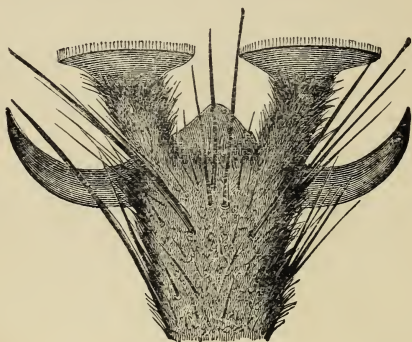
The one does not seem to grow out of the other, but to be suddenly transformed, when the little creature leaps forth to its new life. In fact, the fly, in becoming one, turns itself partly inside out, after the fashion of the clever snake which the showman said could swallow himself, beginning by putting his tail into his mouth.

We have often seen a fly walking upon the ceiling or upon any inverted surface, or running up a smooth pane of glass, and we may have wondered how it managed not only to hold on, but to run about so nimbly.

An examination of that wonderful machine, a fly's foot, by a powerful microscope, will explain the whole of the very simple contrivance by which it seems to set the laws of gravitation at defiance.

Now, if we examine the foot, we shall find it to be composed of a pair of pads with a pair of hooks above them, and the pads clothed with a number of very fine short hairs.

Each pad is hollow, with a little nipple projecting into it. Behind the nipple is a bag connected with it, filled with a very clear, transparent gum. This gum, which is quite liquid, exudes from the nipple by the pressure of the insect in walking, and fills the hollow.



A FLY'S FOOT AS WHEN WALKING ON THE CEILING (Magnified)

The hairs are also hollow, with trumpet-shaped mouths; and these are also thus filled with the gum. So very small are these trumpet-shaped hairs, that there are more than 1000 on each foot-pad.

The gum becomes hard the moment it is exposed to the air, and will not dissolve in water. Thus, at every step, the fly glues itself to the surface; and so tenacious is the gum, that one foot is quite sufficient to bear the weight of the whole suspended body.

We might go on page after page to describe the wonderful anatomy of the fly, as the microscope has revealed

it to us. In fact, there is as much to be said about it as about the body of man, and perhaps more, for its organs are more numerous and more complex.

Not only has it 4000 eyes, instead of two; three sets of brain or nerve-centres instead of one; 1000 hairs and two claws instead of toes on its foot; it has also wings, which we have not; three pairs of legs instead of one; a mouth which would bewilder any dentist; and a proboscis as far beyond that of an elephant in complexity of structure as a railway engine is beyond a wheelbarrow.

---

### LESSON XXIII.

#### THE UGLY DUCKLING,—PART II.

Fa-vour-ite.  
O-pin-ion.  
Sen-sa-tion.  
En-vi-ous.

Out-stretched.  
Per-se-cu-ted.  
New-com-er.  
Dis-a-gree-a-ble.

Joy-ous-ly.  
Con-se-quence.  
Clev-er-est.  
Chat-ter-er.

AFTER the duckling had been on the moor two days, there came two wild geese, or rather goslings, for they had not been out of the egg long, and were very saucy. "Listen, friend," said one of them to the duckling, "you are so ugly that we like you very well. Will you go with us and become a bird of passage? Not far from here is another moor, in which there are some wild geese."

"Pop, pop," sounded in the air, and the two wild geese fell dead among the rushes, and the water was tinged with blood. "Pop, pop," echoed far and wide in the distance, and whole flocks of wild geese rose up from the rushes. The sound continued from every direction, for the sportsmen surrounded the moor, and some were even seated on branches of trees, overlooking the rushes.



The blue smoke from the guns rose like clouds over the dark trees, and as it floated away across the water, a number of sporting dogs bounded in among the rushes, which bent beneath them wherever they went. How they terrified the poor duckling! He turned away his head to hide it under his wing, and at the same moment a large terrible dog passed quite near him. His jaws were open, his tongue hung from his mouth, and his eyes glared fearfully. He thrust his nose close to the duckling, showing his sharp teeth, and then "splash, splash," he went into the water without touching him. "Oh," sighed the duckling, "how thankful I am for being so ugly; even a dog will not bite me." And so he lay quite still, while the shot rattled through the rushes, and gun after gun was fired over him. It was late in the day before all became quiet, but even then the poor thing did not dare to move. He waited quietly for several hours, and then, after looking carefully around him, hastened away from the moor as fast as he could. He ran over field and meadow till a storm arose, and he could hardly struggle against it. Towards evening, he reached a poor little cottage that seemed ready to fall, and only remained standing because it could not decide on which side to fall first. The storm continued so violent, that the duckling could go no farther; he sat down by the cottage, and then he noticed that the door was not quite closed in consequence of one of the hinges having given way. There was, therefore, a narrow opening near the bottom large enough for him to slip through, which he did very quietly, and got a shelter for the night. A woman, a tom-cat, and a hen lived in this cottage. The tom-cat, whom the mistress called "My little son," was a great favourite; he could raise his back, and purr, and could even throw out sparks from



his fur if it were stroked the wrong way. The hen had very short legs, so she was called "Chickie short legs." She laid good eggs, and her mistress loved her as if she had been her own child. In the morning, the strange visitor was discovered, and the tom-cat began to purr, and the hen to cluck.

"What is that noise about?" said the old woman, looking round the room, but her sight was not very good; therefore, when she saw the duckling, she thought it must be a fat duck that had strayed from home. "Oh what a prize!" she exclaimed, "I hope it is not a drake, for then I shall have some duck's eggs. I must wait and see." So the duckling was allowed to remain on trial for three weeks, but there were no eggs. Now, the tom-cat was the master of the house, and the hen was mistress, and they always said, "We and the world," for they believed themselves to be half the world, and the better half too. The duckling thought that others might hold a different opinion on the subject, but the hen would not listen to such doubts. "Can you lay eggs?" she asked. "No." "Then have the goodness to hold your tongue." "Can you raise your back, or purr, or throw out sparks?" said the tom-cat. "No." "Then you have no right to express an opinion when sensible people are speaking." So the duckling sat in a corner, feeling very low-spirited, till the sunshine and the fresh air came into the room through the open door, and then he began to feel such a great longing for a swim on the water, that he could not help telling the hen.

"What an absurd idea," said the hen. "You have nothing else to do, therefore you have foolish fancies. If you could purr or lay eggs, they would pass away."

"But it is so delightful to swim about on the water," said the duckling, "and so refreshing to feel

it close over your head, while you dive down to the bottom."

"Delightful indeed!" said the hen, "why, you must be crazy! Ask the cat, he is the cleverest animal I know, ask him how he would like to swim about on the water, or to dive under it, for I will not speak of my own opinion; ask our mistress, the old woman—there is no one in the world more clever than she is. Do you think she would like to swim, or to let the water close over her head?"

"You don't understand me," said the duckling.

"We don't understand you? Who can understand you, I wonder? Do you consider yourself more clever than the cat, or the old woman? I will say nothing of myself. Don't imagine such nonsense, child, and thank your good fortune that you have been received here. Are you not in a warm room, and in society from which you may learn something. But you are a chatterer, and your company is not very agreeable. Believe me, I speak only for your good. I may tell you unpleasant truths, but that is a proof of my friendship. I advise you, therefore, to lay eggs, and learn to purr as quickly as possible."

"I believe I must go out into the world again," said the duckling.

"Yes, do," said the hen. So the duckling left the cottage, and soon found water on which it could swim and dive, but was avoided by all other animals, because of its ugly appearance. Autumn came, and the leaves in the forest turned to orange and gold; then, as winter approached, the wind caught them as they fell, and whirled them in the cold air. The clouds, heavy with hail and snow-flakes, hung low in the sky, and the raven stood on the ferns crying, "Croak, croak." It made one

shiver with cold to look at him. All this was very sad for the poor little duckling. One evening, just as the sun set amid radiant clouds, there came a large flock of beautiful birds out of the bushes. The duckling had never seen any like them before. They were swans, and they curved their graceful necks, while their soft plumage shone with dazzling whiteness. They uttered a singular cry, as they spread their glorious wings and flew away from those cold regions to warmer countries across the sea. As they mounted higher and higher in the air, the ugly little duckling felt quite a strange sensation as he watched them. He whirled himself in the water like a wheel, stretched out his neck towards them, and uttered a cry so strange that it frightened himself. Could he ever forget those beautiful, happy birds; and when at last they were out of his sight, he dived under the water, and rose again almost beside himself with excitement. He knew not the names of these birds, nor where they had flown, but he felt towards them as he had never felt for any other bird in the world. He was not envious of these beautiful creatures, but wished to be as lovely as they. Poor ugly creature, how gladly he would have lived even with the ducks had they only given him encouragement. The winter grew colder and colder; he was obliged to swim about on the water to keep it from freezing, but every night the space on which he swam became smaller and smaller. At length it froze so hard that the ice in the water crackled as he moved, and the duckling had to paddle with his legs as well as he could, to keep the space from closing up. He became exhausted at last, and lay still and helpless, frozen fast in the ice.

Early in the morning, a peasant, who was passing by, saw what had happened. He broke the ice in pieces

with his wooden shoe, and carried the duckling home to his wife. The warmth revived the poor little creature ; but when the children wanted to play with him, the duckling thought they would do him some harm ; so he started up in terror, fluttered into the milk-pan, and splashed the milk about the room. The old woman clapped her hands, which frightened him still more. He flew first into the butter-cask, then into the meal-tub, and out again. What a condition he was in ! The woman screamed, and struck at him with the tongs ; the children laughed and screamed, and tumbled over each other, in their efforts to catch him ; but luckily he escaped. The door stood open ; the poor creature could just manage to slip out among the bushes, and lie down quite exhausted in the newly fallen snow.

It would be very sad, were I to relate all the misery and privations which the poor little duckling endured during the hard winter ; but when it had passed, he found himself lying one morning in a moor, amongst the rushes. He felt the warm sun shining, and heard the lark singing, and saw that all around was beautiful spring. Then the young bird felt that his wings were strong, as he flapped them against his sides, and rose high into the air. They bore him onwards, until he found himself in a large garden, before he well knew how it had happened. The apple-trees were in full blossom, and the fragrant elders bent their long green branches down to the stream which wound round a smooth lawn. Everything looked beautiful, in the freshness of early spring. From a thicket close by came three beautiful white swans, rustling their feathers, and swimming lightly over the smooth water. The duckling remembered the lovely birds, and felt more strangely unhappy than ever.

"I will fly to these royal birds," he exclaimed, "and they will kill me, because I am so ugly, and dare to approach them ; but it does not matter : better be killed by them than pecked by the ducks, beaten by the hens, pushed about by the maiden who feeds the poultry, or starved with hunger in the winter."

Then he flew to the water, and swam towards the beautiful swans. The moment they espied the stranger, they rushed to meet him with outstretched wings.

"Kill me," said the poor bird ; and he bent his head down to the surface of the water, and awaited death.

But what did he see in the clear stream below ? His own image ; no longer a dark, grey bird, ugly and disagreeable to look at, but a graceful and beautiful swan. To be born in a duck's nest, in a farmyard, is of no consequence to a bird, if it is hatched from a swan's egg. He now felt glad at having suffered sorrow and trouble, because it enabled him to enjoy so much better all the pleasure and happiness around him ; for the great swans swam round the new-comer, and stroked his neck with their beaks, as a welcome.

Into the garden presently came some little children, and threw bread and cake into the water.

"See," cried the youngest, "there is a new one ;" and the rest were delighted, and ran to their father and mother, dancing and clapping their hands, and shouting joyously, "There is another swan come ; a new one has arrived."

Then they threw more bread and cake into the water, and said, "The new one is the most beautiful of all ; he is so young and pretty." And the old swans bowed their heads before him.

Then he felt quite ashamed, and hid his head under his wing ; for he did not know what to do, he was so

happy, and yet not at all proud. He had been persecuted and despised for his ugliness, and now he heard them say he was the most beautiful of all the birds. Even the elder-tree bent down its boughs into the water before him, and the sun shone warm and bright. Then he rustled his feathers, curved his slender neck, and cried joyfully, from the depths of his heart, "I never dreamed of such happiness as this while I was an ugly duckling."

---

## LESSON XXIV.

## THE WRECK OF THE "HESPERUS."

It was the schooner "Hesperus,"  
That sail'd the wintry sea ;  
And the skipper had taken his little daughter,  
To bear him company.

Blue were her eyes as the fairy flax,  
Her cheeks like the dawn of day,  
And her bosom white as the hawthorn buds,  
That ope in the month of May.

The skipper he stood beside the helm,  
His pipe was in his mouth,  
And he watch'd how the veering flaw did blow  
The smoke now west, now south.

Then up and spake an old sailor,  
Had sail'd the Spanish Main :  
"I pray thee put into yonder port,  
For I fear the hurricane.

"Last night the moon had a golden ring,  
And to-night no moon we see !"  
The skipper he blew a whiff from his pipe,  
And a scornful laugh laugh'd he.



Colder and colder blew the wind,  
A gale from the north-east ;  
The snow fell hissing in the brine,  
And the billows froth'd like yeast.

Down came the storm and smote amain  
The vessel in its strength ;  
She shudder'd and paused like a frightened steed,  
Then leap'd her cable's length.

"Come hither ! come hither ! my little daughter  
And do not tremble so,  
For I can weather the roughest gale,  
That ever wind did blow."

He wrapp'd her warm in his seaman's coat,  
Against the stinging blast ;  
He cut a rope from a broken spar,  
And bound her to the mast.

"O father ! I hear the church bells ring,  
O say, what may it be !"  
"Tis a fog-bell on a rock-bound coast !"  
And he steer'd for the open sea.

"O father ! I hear the sound of guns,  
O say what may it be ?"  
"Some ship in distress that cannot live  
In such an angry sea !"

"O father I see a gleaming light,  
O say what may it be ?"  
But the father answer'd never a word—  
A frozen corpse was he.

Lash'd to the helm, all stiff and stark,  
With his face turn'd to the skies,  
The lantern gleam'd through the gleaming snow  
On his fix'd and glassy eyes.

Then the maiden clasp'd her hands and pray'd  
That sav'd she might be ;  
And she thought of Christ who still'd the waves  
On the Lake of Galilee.

And fast through the midnight dark and drear,  
Through the whistling sleet and snow,  
Like a sheeted ghost the vessel swept  
T'wards the reef of Norman's Woe.

And ever the fitful gusts between  
A sound came from the land ;  
It was the sound of the trampling surf  
On the rocks and the hard sea-sand.

The breakers were right beneath her bows,  
She drifted a dreary wreck,  
And a whooping billow swept the crew  
Like icicles from her deck.

She struck where the white and fleecy waves  
Look'd soft as carded wool,  
But the cruel rocks they gored her sides  
Like the horns of an angry bull.

Her rattling shrouds all sheath'd in ice,  
With the masts went by the board ;  
Like a vessel of glass she stove and sank,  
Ho ! ho ! the breakers roar'd.

At daybreak on the bleak sea-beach  
A fisherman stood aghast,  
To see the form of a maiden fair  
Lash'd close to a drifting mast.

The salt sea was frozen on her breast,  
The salt tears in her eyes ;  
And he saw her hair like the brown sea-weed,  
On the billows fall and rise.

Such was the wreck of the "Hesperus,"  
 In the midnight and the snow;  
 Heav'n save us all from a death like this.  
 On the reef of Norman's Woe!

*Longfellow.*

## LESSON XXV.

### THE SLOTH.

Sol-it-ar-y.  
 Ap-pa-rent-ly.  
 In-ca-pa-ble.  
 Ex-trem-it-ies.

In-nu-mer-a-ble.  
 Pro-tu-ber-an-ces.  
 In-con-ve-ni-ence.  
 Sin-gu-lar-it-y.

Sit-u-a-tion.  
 In-ter-ve-ning.  
 Ex-tra-or-din-ar-y.  
 In-ter-wo ven.

THIS singular animal is destined by nature to live and die in the trees; and, to do justice to him, should be examined in this his upper element. He is a scarce and solitary animal, and being good food, he is never allowed to escape. He inhabits remote and gloomy forests, where snakes take up their abode, and where cruelly-stinging ants and scorpions, and swamps, and innumerable thorny shrubs and bushes obstruct the steps of civilised man. He has no soles on his feet, and he is evidently ill at ease when he tries to move on the ground. His fore-legs, or more correctly speaking, his arms, are apparently much too long, while his hind-legs are very short, and look as if they could be bent almost to the shape of a cork-screw. Both the fore and hind legs, by their form, and by the manner in which they are joined to the body, are quite incapable of supporting the poor animal on the earth, as the bodies of other quadrupeds are supported by their legs. Now, granted that he supported himself on his legs like other animals, nevertheless he would be in pain, for he has no soles to his feet, and his claws are very sharp and long and curved; so that, were his body supported by his feet, it would be by their extremities, just as your body would

be were you to throw yourself on all fours, and try to support it on the ends of your toes and fingers—a trying position. Were the floor of glass, or of a polished surface, the sloth could not move; but as the ground is generally rough, with little protuberances upon it, such as stones, or roots of grass, etc., this just suits the sloth, and he moves his fore-legs in all directions, in order to find something to lay hold of; and when he has succeeded, he pulls himself forward, and is thus enabled to travel onwards, but at the same time, in so tardy and awkward a manner, as to acquire for him the name of sloth.

Indeed, his looks and his gestures evidently betray his uncomfortable situation; and as a sigh every now and then escapes him, we may be entitled to conclude that he is actually in pain.

The sloth, in its wild state, spends its whole life in trees, and never leaves them but through force, or by accident. An all-ruling Providence has ordered man to tread on the surface of the earth, the eagle to soar in the skies, and the monkey and squirrel to inhabit the trees. Still these may change their relative situations without feeling much inconvenience; but the sloth is doomed to spend his whole life in the trees. What is more extraordinary, not *upon* the branches, like the squirrel and monkey, but *under* them. He moves suspended from the branch, he rests suspended from it, and he sleeps suspended from it. To enable him to do this, he must have a very different formation from that of any known quadruped. Hence it is but fair to surmise that he enjoys life just as much as any other animal.

When asleep, he supports himself from a branch parallel to the earth. He first seizes the branch with one arm, and then with the other, and after that brings up both his legs, one by one. to the same branch, so that

all four are in a line ; he seems perfectly at rest in this position. There is a singularity in his hair different from that of all other animals ; it is thick and coarse at the extremity, and gradually tapers to the root, when it becomes fine as a spider's web. His fur has so much the hue of the moss which grows on the branches of the trees, that it is very difficult to make him out when at rest. He moves from tree to tree by the interwoven branches. He travels at a good round pace ; and were you to see him pass from tree to tree as I have done, you would never think of calling him a sloth.

One day I saw a large two-toed sloth on the ground upon a bank of a river ; how he had got there nobody could tell. The Indian with me said he had never surprised a sloth in such a situation before ; he would hardly have come there to drink, for both above and below the place the branches of the trees touched the water, and afforded him an easy and safe access to it. Be this as it may, though the trees were not above twenty yards from him, he could not make his way through the sand time enough to escape before we landed. As soon as we got up to him, he threw himself on his back, and defended himself in gallant style with his fore-legs. "Come, poor fellow !" said I to him, "if thou hast got into a hobble to-day, thou shalt not suffer for it ; I'll take no advantage of thee in thy misfortune. The forest is large enough both for thee and me to rove in ; go thy ways up above, and enjoy thyself in these endless wilds ; it is more than probable thou wilt never have another interview with man. So fare thee well." On saying this, I took a long stick which was lying there, held it for him to hook on, and then conveyed him to a high and stately tree. He now went off in a side direction, and caught hold of the branch of a neighbouring

tree ; he then proceeded towards the heart of the forest. I stood looking on, lost in amazement at his singular mode of progress. I followed him with my eye till the intervening branches closed in betwixt us ; and then I lost sight for ever of the two-toed sloth. I was going to add that I never saw a sloth take to his heels in such earnest ; but the expression will not do, for the sloth has no heels.

---

### LESSON XXVI.

#### THE GULF STREAM.

Might-i-est.  
Re-luc-tance.  
Va-can-cy.  
Im-a-gined.

Mis-sis-sip-pi.  
Car-o-li-na.  
Com-plic-a-ted.  
Pe-cu-li-ar-it-ies.

Af-fin-it-y.  
Nav-i-ga-tors.  
Rev-o-lu-tion.  
In-ex-tric-a-bly.

THERE is a river in the ocean, flowing at the rate of from thirty to seventy-eight miles a day. In the severest droughts it never fails, and in the mightiest floods it never overflows. Its banks and its bottom are of cold water, while its current is of warm. The Gulf of Mexico is its fountain, and its mouth is in the Arctic seas. It is the Gulf Stream. There is in the world no other such majestic flow of waters. Its current is more rapid than the Mississippi or the Amazon.

Its waters, as far out from the Gulf as the Carolina coasts, are of an indigo blue. They are so distinctly marked that their line of junction with the common sea-water may be traced by the eye. Often one-half of the vessel may be perceived floating in Gulf Stream water, while the other half is in common water of the sea ; so sharp is the line, and such the want of affinity between those waters, and the reluctance, on the part of those of the Gulf Stream, to mingle with the common water of the sea.



Seafaring people often throw a bottle overboard enclosing a paper, marking the time and place at which it is done. In the absence of other information as to currents, that afforded by these mute little navigators is of great value. Bottles cast into the sea midway between the Old and New Worlds, near the coasts of Europe, Africa, and America, at the extreme north or farthest south, have been found either in the West Indies, or within the well-known range of Gulf Stream waters. Of two cast out together on the south coast of Africa, the one was found on the island of Trinidad, the other on Guernsey, in the English Channel. Another bottle thrown over off Cape Horn by an American master, was picked up on the coast of Ireland. From this it appears that the waters from every quarter of the Atlantic tend toward the Gulf of Mexico and its stream.

The question arises, What causes the Gulf Stream? Water at the poles is cold enough to ice champagne, and at the equator it is nearly warm enough for shaving. Water expands when warmed; our pots boil over; and although the ocean certainly is nowhere hot enough to boil a leg of mutton, the great mass of water rises under the influence of tropic heat above the common level, and runs over the poles, leaving its place empty for cold water to rush in and occupy. Precisely in the same way, air, which is another ocean, swells at the equator, and pours out its deluge north and south over the colder current, which runs in to take advantage of the vacancy, and warms itself. When warm, it also will get up.

That is one fact; another modifies it. The earth rolls on its own axis. If you stick a knitting-needle through the centre of an orange, and cause the orange to rotate on the needle, then you have a model of the earth revolving on its axis. The needle comes out of the North

Pole above, and out of the South Pole below; and if you scratch a line all round the orange, between pole and pole, that is the imagined line called the equator.

Now take two little pins: stick one of them on the equator, and another in the neighbourhood of either pole; set the orange now revolving, like the globe itself, from west to east, and make precisely one revolution. In the same space of time one pin has travelled through a great space, you perceive—all round the orange, as it were; while the pin near the pole has had a very tiny journey to perform, and on the pole itself would absolutely not revolve at all. So, then, upon this world of ours, everything, on or near the equator, spins round in the twenty-four hours far more rapidly than anything placed near the poles.

But everything partakes of the movement of a railway train—when the train stops suddenly your body travels on, and is thrown violently forward. So air and water, flowing from the equator in great currents, because they cannot at once accommodate themselves to the slower movements of the earth as they approach the poles, retain their progressive force, and shoot on eastward still, as well as north and south. The slow trains coming up from the poles are outstripped by the rapid movement of the earth below, and being unable readily to accommodate themselves to it, they lag behind and fall into a westward course.

By this movement of the earth, therefore, a transverse direction is communicated to the great equatorial and polar currents, whether of air or water. Furthermore, local peculiarities, arrangements of island and continent, plain and mountain, land and water, cause local variations of temperature; and every such variation modifies or creates a current.

Taking the South Pole as the starting point, let us trace the mighty current under notice. It first of all runs through the great sieve of islands between Australia and China, part of it being directed northward in a warm current along the south-eastern borders of Japan.

Now we follow it into the Indian Ocean, where the currents are inextricably complicated with the winds; but if the winds expect attention at present, they may whistle for it. It is enough to say, that the great equatorial stream, still pouring westward, strikes against the coast of Africa, and finding no thoroughfare, pours southward on each side of Madagascar, and doubles the Cape. Then turning northward, it is diverted by the shape of the coast between Benin and Sierra Leone, not from the land, but from the edge of a returning stream that coasts it.

After giving off a north-west branch, with a temperature now of seventy-nine degrees under the equator, the main current strikes the east prominence of South America at Cape St. Roque. This causes it to split. A southerly branch flows in the direction of Cape Horn, and goes home to the Pacific, tired of travel; but the remainder hastening northward, flows through the West India Islands into the Gulf of Mexico, which is simply a hollow excavated by its stream.

In the Gulf of Mexico, encompassed by land, the water, which has for a long time been acquiring warmth, offers the greatest contrast to the chilly state in which it set out on its journey. Near the mouth of the Mississippi, its temperature reaches eighty-nine degrees.

As the stream flows constantly into the Gulf, it must, of course, also constantly flow out. It flows out between Florida and Cuba, now under the name of the Gulf Stream. This coasts northward, having a cold counter-

current between it and the shore, and crosses the Atlantic south of the great bank of Newfoundland, most of it flowing southward, to return home by a set of counter-currents.

---

## LESSON XXVII.

### A PET MONKEY.

Hid-e-ous.  
Ar-ri-val.  
Im-pa-tient.  
En-or-mous.

In-tel-li-gence.  
Dif-fi-cul-ty.  
In-ces-sant-ly.  
Rid-ic-u-lous.

In-ex-press-ib-ly.  
Ex-tra-or-din-ar-y.  
Op-er-a-tions.  
Sat-is-fac-to-ry.

JOEY came last year from the great forests near Panama, and when I first saw him after his sea-voyage I thought him more like a little black imp than anything else.

He was very small and hideous, jet black, with a white beard and enormous eyes. Having lived in a rough box or cage on board, he had rubbed all the hair off his body and tail, and was very thin and dirty besides. On his arrival he was made to undergo a whole course of warm baths, which he hated; but they improved him immensely, and in a few weeks he became completely clothed in a coat of long glossy black hair, and as handsome as he was capable of looking, which, however, is not saying much.

Joey never was shy; his intelligence and cleverness were extraordinary: but it was impossible to make a pet of him on account of his incurably dirty habits, and his unceasing mischief. He was never still for a second, and *always* doing something wrong, and yet he was so inexpressibly ridiculous that no one had the heart to punish him.

Our home at this time was in the country, so Joey had a wide field for mischief; and as he arrived whilst it was still summer, he commenced some extensive gardening

operations of his own at once, which resulted in depriving me of every leaf and blossom on my creepers.

No chain could keep him confined; it was merely a question of time. Joey sat down to consider how to get rid of every attempt to fasten him up, and his little clever fingers always contrived to free himself.

He would eat or drink almost anything, but he was not at all greedy; the food he liked best was bread and milk, but he took very little of even that. How you would have laughed to see Joey and his favourite companion the kitten sharing their morning meal of milk!

He soon taught the kitten that he was to have the first drink, and would lift the little cup up to his lips, take as much as he wanted, placing it on the floor for the kitten afterwards; but, whilst she was lapping slowly and with great difficulty, Joey would get impatient, and shake the cup to hasten her movements, walk all round her, tweaking her tail or nipping her fur; but the kitten never stopped lapping, and when he could bear it no longer he used suddenly to drag her head up by both her ears, snatch away the cup, and either break the pieces as the shortest way of disposing of it, or nimbly mount upon a table or chair and put it out of poor Pussy's reach.

The worst of this playfellow for Joey was that she wanted to play all night and sleep all day, whereas Joey never was still for a second in the daylight, but as soon as it became dusk he rolled himself up in his blanket and went to sleep. He could not bear to be disturbed, and used to get into furious rages with the kitten, after vainly trying to persuade her to be quiet and share his blanket with him.

I had to watch Joey incessantly, on account of his love of hearing the crash china made in falling; the cook could not keep a cup or plate on the dresser—they had to be



stowed away in drawers; and for several weeks Joey tried to get at a thermometer which hung outside the house. It baffled him for some time, but at last he discovered a projecting nail, round which he curled his long tail, swung himself up, and had the great satisfaction of making a splendid smash of it.

Fortunately, the only room in the house into which he would not venture alone was the drawing-room.

On each side of the fire-place stood screens of stuffed Indian pheasants, of bright and gaudy plumage. Joey was horribly afraid of these, and when I took him into the room never ceased clinging tight round my neck with one slender paw, whilst he covered his face with the other, and peeped at the birds with evident awe.

One day I heard extraordinary sounds of choking proceeding from a bed-room as I passed it; the door was closed, but not fastened, so I first knocked, and then, as no one answered, looked in. There was Joey seated on the dressing-table, with his head back, waving his long arms, his eyes starting out of his head, and at the last gasp for want of breath. I found he was trying to swallow a large signet-ring, and it had stuck in his throat; there was enough of it in his mouth for me to take hold of, and I got it up with much difficulty.

He had previously put everything in the room which could be squeezed down its neck into the water-jug; the soap and sponges were there, so were several trinkets lying about and a small pin-cushion; the candles (he had broken the candlesticks) and a slipper were sticking out at the top.



## LESSON XXVIII.

## MODERATE EXERCISE.

Ac-cu-mu-late.	Con-tin-u-al-ly.	Sys-tem-at-ic.
Sed-en-tar-y.	Ad-van-ta-ge-ous.	Stim-u-la-tion.
Suf-fic-ient-ly.	Pu-ri-fic-a-tion.	Un-ac-cus-tomed.
Es-pec-ial-ly.	In-stan-ta-ne-ous-ly.	Viv-i-fy-ing.

A PERSON may eat wholesome food, drink pure water, and breathe fresh air continually, and yet may fall into bad health. If he fail to take sufficient exercise, some of the functions of the body will not be properly performed; waste matters, that ought to be expelled, will be retained in the system; fat will accumulate to such an extent as to overload some of the organs; and disease will be the result. Persons who lead sedentary lives, that is, whose occupation keeps them constantly indoors, show by their appearance that their mode of living is much less healthy than that of men who work in the open air. It is therefore necessary for such persons to take steps for preserving their health by exercise of some sort, apart from their daily work.

Exercise may be defined as movement of the muscles of the body. The human frame is covered with muscles, which are the same substance as that called flesh. These muscles are supplied with blood-vessels and nerves. The movements of the muscles are contraction and extension—shortening and lengthening—by means of which the position of the bones to which they are attached is changed at pleasure. Most of the muscles of the body are under the control of the *will*, which acts through the nerves. A muscle that is not sufficiently exercised grows smaller, softer, and weaker. It does not obey promptly the command of the will, or respond vigorously to the stimulus of the nerves. On the contrary, when a

muscle is sufficiently, but not immoderately, exercised, it increases in size, firmness, and strength; it obeys the dictates of the will fully and instantaneously.

But besides the benefit caused to the muscles themselves, exercise is advantageous to the system generally in a variety of ways. For example, the circulation of the blood is stimulated; the heart beats more strongly and more rapidly; and as a larger quantity of fresh blood is carried to every part, but more especially to the muscles that are most vigorously exercised, more nourishment is supplied for building up the various substances of which the body is composed. At the same time, the digestive functions, by which food is converted into blood, are assisted and strengthened; and one of the first beneficial results of judicious exercise is the improvement of the appetite. A greater desire for food is experienced, and it is partaken of with greater relish.

Again, the respiration is improved. It is true that a person unaccustomed to exercise finds his breathing somewhat impeded on first commencing a brisk walk or run; but the feeling soon wears off, and, in the end, he notes that his chest has expanded, and that his respiration is fuller, freer, and deeper. The oppressive feeling experienced at the commencement of vigorous exertion is caused by the more rapid supply of blood to the lungs, and the inability to furnish sufficient oxygen for its purification. But the waste matter is soon exhaled; the carbonic acid gas which the blood parts with is expelled from the system, and vivifying oxygen takes its place.

Moreover, the skin shares in the general stimulation arising from exercise. It is one of the chief purifying organs, and waste being increased during exercise, the skin carries off an increased amount of effete matter in

the perspiration then produced. Nor do the benefits of judicious exercise stop with the inferior organs. The brain and whole nervous system are strengthened and invigorated.

Seeing, then, that exercise is so useful, we ought to be careful to take advantage of all proper means of practising it, whatever our occupation may be. For boys and girls, their ordinary games, combined with the exertion of going to school and helping their parents, will suffice; but, even in their case, care should be taken that their exercise is not too violent. Singing and reading aloud are also most excellent as bodily, as well as mental, exercises. Walking calls into action the muscles of the lower extremities, and is therefore good exercise for persons whose occupation requires them to sit. But it is also necessary to exercise the muscles of the upper parts of the body—the arms, chest, and back; and for this purpose rowing, cricket, and ball-playing are very appropriate. Running and leaping, when kept within due bounds, are also to be commended; and, under a judicious instructor, the training in systematic movements, called gymnastics, is of the greatest use.

But to be of service to bodily health, exercise must be moderate. Violent or excessive exercise is attended with many dangers to health, and even to life. For, in the first place, there is risk of straining a muscle or tendon, from which permanent weakness of the part may result; or a bone may be snapped, as happened to the cricketer who broke his arm in a violent effort to throw up the ball. More serious even than a strained muscle or fractured limb, are the constitutional injuries likely to arise from exertion too violent or too protracted. Among the mischiefs thus caused, one of the most important is heart disease, which is sometimes brought

on by efforts beyond the strength of the individual. In that case, not only is life shortened, but the sufferer is tormented by fears and anxieties during the space of time he survives. Another vital organ, the lungs, also suffers from excessive exercise, and the foundation of some mortal disease, such as consumption, is not unfrequently laid during the excitement of the cricket field, or the rowing match. Equally dangerous is the injury to the nervous system caused by great and protracted exertion, from which proceeds the debility that later in life terminates in paralysis. There may, of course, be occasions when life can be saved only by undergoing some of the risks just specified; but, speaking of voluntary exercise, the rule is to stop as soon as the strain is felt to be excessive, either by reason of violence or long continuance.

There is another form of danger which is incidental to all exercise but the very mildest—that arising from *chill*. A person, in taking exercise, becomes heated, perspires freely, and feels oppressed and uncomfortable. If he is unwise, he exposes himself to the cool breeze; or if he is altogether foolish, he plunges into a cold bath. The consequence is, that he either contracts a disease of the lungs from which he dies slowly, or a fever which carries him off with appalling rapidity.

While, therefore, exercise is necessary to the preservation of health, it is requisite that such exercise should be taken *in moderation*.

---

## LESSON XXIX.

## DIFFERENT COUNTRIES COMPARED.

BUT where to find that happiest spot below,  
Who can direct, when all pretend to know?  
The shuddering tenant of the frigid zone  
Boldly proclaims that happiest spot his own;  
Extols the treasures of his stormy seas,  
And his long nights of revelry and ease.  
The naked negro, panting at the line,  
Boasts of his golden sands and palmy wine,  
Basks in the glare, or stems the tepid wave,  
And thanks his gods for all the good they gave.  
Such is the patriot's boast, where'er we roam,  
His first, best country ever is at home.  
And yet, perhaps, if countries we compare,  
And estimate the blessings which they share,  
Though patriots flatter, still shall wisdom find  
An equal portion dealt to all mankind,  
As different good, by art or nature given  
To different nations, makes their blessings even.

Far to the right, where Appenine ascends,  
Bright as the summer, Italy extends;  
Its uplands sloping, deck the mountain's side,  
Woods over woods in gay theatric pride,  
While oft some temple's mouldering tops between,  
With memorable grandeur, mark the scene.  
Could Nature's bounty satisfy the breast,  
The sons of Italy were surely blest.  
Whatever fruits in different climes are found,  
That proudly rise, or humbly court the ground,—  
Whatever blooms in torrid tracts appear,  
Whose bright succession decks the varied year,—  
Whatever sweets salute the northern sky  
With vernal lives that blossom but to die,—  
These, here disporting, own the kindred soil,

Nor ask luxuriance from the planter's toil ;  
While sea-born gales their gelid wings expand  
To winnow fragrance round the smiling land.

Turn we to survey  
Where rougher climes a nobler race display—  
Where the bleak Swiss their stormy mansions tread,  
And force a churlish soil for scanty bread.  
No product here the barren hills afford  
But man and steel, the soldier and his sword ;  
No vernal blooms their torpid rocks array,  
But winter lingering chills the lap of May ;  
No zephyr fondly sues the mountain's breast,  
But meteors glare, and stormy glooms invest ;  
Yet still, e'en here, content can spread a charm,  
Redress the clime, and all its rage disarm.  
Though poor the peasant's hut, his feasts though small,  
He sees his little lot the lot of all ;  
Sees no contiguous palace rear its head  
To shame the meanness of his humble shed ;  
No costly lord the sumptuous banquet deal,  
To make him loathe his vegetable meal ;  
But calm, and bred in ignorance and toil,  
Each wish contracting, fits him for the soil.  
Cheerful at morn, he wakes from short repose,  
Breasts the keen air, and carols as he goes ;  
With patient angle trolls the finny deep,  
Or drives his venturous ploughshare to the steep ;  
Or seeks the den where snow-tracks mark the way,  
And drags the struggling savage into day.  
At night returning, every labour sped,  
He sits him down, the monarch of a shed ;  
Smiles by his cheerful fire, and round surveys  
His children's looks, that brighten at the blaze,  
While his loved partner, boastful of her hoard,  
Displays her cleanly platter on the board ;  
And haply, too, some pilgrim, thither led,  
With many a tale repays the nightly bed.  
Thus every good his native wilds impart



Imprints the patriot passion on his heart ;  
And even those hills that round his mansion rise  
Enhance the bliss his scanty fund supplies ;  
Dear is that shed to which his soul conforms,  
And dear that hill which lifts him to the storms ;  
And as a child, when scaring sounds molest,  
Clings close and closer to the mother's breast,  
So the loud torrent and the whirlwind's roar  
But bind him to his native mountains more.

To kinder skies, where gentler manners reign,  
I turn, and France displays her bright domain.  
Gay, sprightly land of mirth and social ease,  
Pleased with thyself whom all the world can please,  
How often have I led thy sportive choir,  
With tuneless pipe, beside the murmuring Loire,  
Where shading elms along the margin grew,  
And, freshened from the wave, the zephyr flew !  
And haply, though my harsh touch, faltering still,  
But mocked all tune and marred the dancer's skill,  
Yet would the village praise my wondrous power,  
And dance, forgetful of the noontide hour.  
Alike all ages ; dames of ancient days  
Have led their children through the mirthful maze ;  
And the gay grandsire, skilled in gestic lore,  
Has frisked beneath the burden of threescore.  
So blessed a life these thoughtless realms display ;  
Thus idly busy rolls their world away.  
Theirs are those arts that mind to mind endear,  
For honour forms the social temper here :  
Honour, that praise which real merit gains,  
Or even imaginary worth obtains,  
Here passes current ; paid from hand to hand,  
It shifts in splendid traffic round the land ;  
From courts to camps, to cottages it strays,  
And all are taught an avarice of praise.

To men of other minds my fancy flies,  
Embosomed in the deep where Holland lies.

Methinks her patient sons before me stand,  
 Where the broad ocean leans against the land ;  
 And sedulous to stop the coming tide,  
 Lift the tall rampart's artificial pride.  
 Onward, methinks, and diligently slow,  
 The firm connected bulwark seems to grow,  
 Spreads its long arms amidst the watery roar,  
 Scoops out an empire, and usurps the shore :  
 While the pent ocean, rising o'er the pile,  
 Sees an amphibious world beneath him smile ;  
 The slow canal, the yellow-blossomed vale,  
 The willow-tufted bank, the gliding sail,  
 The crowded mart, the cultivated plain,  
 A new creation rescued from his reign.

---

## LESSON XXX.

## KING SOLOMON AND THE HOOPOES:

## AN EASTERN FABLE.

Cab-al-ist-ic.  
 Con-ve-ni-ence.  
 Re-bel-li-ous.  
 Coun-cil-lors.

O-bei-sance.  
 Em-er-ald.  
 O-be-di-ence.  
 Car-ri-on.

Prin-cess-es.  
 Un-fre-quent-ed.  
 Per-se-cu-tion.  
 Ve-ra-ci-ous.

IN the days of King Solomon, the son of David, who, by the virtue of his cabalistic seal, reigned supreme over genii as well as men, and who could speak the languages of animals of all kinds, all created beings were subservient to his will. Now, when the king wanted to travel, he made use for his convenience of a carpet of a square form. This carpet had the property of extending itself to a sufficient size to carry a whole army, with the tents and baggage; but at other times it could be re-

duced so as to be only large enough for the support of the royal throne, and of those ministers whose duty it was to attend upon the person of the sovereign. Four genii of the air then took the four corners of the carpet, and carried it with its contents wherever King Solomon desired. Once the king was on a journey in the air, carried upon his throne of ivory over the various nations of the earth. The rays of the sun poured down upon his head, and he had nothing to protect him from its heat. The fiery beams were beginning to scorch his neck and shoulders, when he saw a flock of vultures flying past. "O vultures!" cried King Solomon, "Come and fly between me and the sun, and make a shadow with your wings to protect me, for its rays are scorching my neck and my face." But the vultures answered and said, "We are flying to the north, and your face is turned towards the south. We desire to continue on our way; and be it known unto thee, O king! that we will not turn back on our flight; neither will we fly above your throne to protect you from the sun, although its rays may be scorching your neck and face." Then King Solomon lifted up his voice and said, "Cursed be ye, O vultures! and because ye will not obey the commands of your lord, who rules over the whole world, the feathers of your neck shall fall off; and the heat of the sun, and the cold of the winter, and the keenness of the wind, and the beating of the rain, shall fall upon your rebellious necks, which shall not be protected with feathers like the necks of other birds. And whereas ye have hitherto fared delicately, henceforward ye shall eat carrion and feed upon offal; and your race shall be impure till the end of the world." And it was done unto the vultures as King Solomon had said.

Now it fell out, that there was a flock of hoopoes fly-

ing past, and the king cried out to them, and said, "O hoopoes! come and fly between me and the sun, that I may be protected from its rays by the shadow of your wings." Whereupon the king of the hoopoes answered and said, "O king, we are but little fowls, and we are not able to afford much shade; but we will gather our nation together, and by our numbers we will make up for our small size." So the hoopoes gathered together, and, flying in a cloud over the throne of the king, they sheltered him from the rays of the sun.



When the journey was over, and King Solomon sat upon his golden throne, in his palace of ivory, whereof the doors were emerald, and the windows of diamonds, larger even than the diamonds of Jemshid, he commanded that the king of the hoopoes should stand before his feet. "Now," said King Solomon, "for the service that thou and thy race have rendered, and the obedience thou hast shown to the king, thy lord and master, what shall be done unto thee, O hoopoe? and what shall be given to the hoopoes of thy race, for a memorial and a reward?"

Now the king of the hoopoes was confused with the great honour of standing before the feet of the king; and, making his obeisance, and laying his right claw upon his heart, he said, "O king, live-for ever! Let a day be given to thy servant to consider with his queen and his councillors, what it shall be that the king shall give unto us for a reward." And King Solomon said, "Be it so."

But the king of the hoopoes flew away; and he went to his queen, and told her what had happened, and he desired her advice as to what they should ask of the king for a reward. And he called together his council, and they sat upon a tree, and they each of them desired a different thing. Some wished for a long tail; some wished for blue and green feathers; some wished to be as large as ostriches; some wished for one thing, and some for another; and they debated till the going down of the sun, but they could not agree together. Then the queen took the king of the hoopoes apart, and said to him, "My dear lord and husband, listen to my words; and, as we have preserved the head of King Solomon, let us ask for crowns of gold on our heads, that we may be superior to all other birds." And the words of the queen and the princesses her daughters prevailed; and the king of the hoopoes presented himself before the throne of Solomon, and desired of him that all hoopoes should wear golden crowns upon their heads. Then Solomon said, "Hast thou considered well what it is that thou desirest?" And the hoopoe said, "I have considered well, and we desire to have golden crowns upon our heads." So Solomon replied, "Crowns of gold shall ye have; but, behold, thou art a foolish bird. And when the evil days shall come upon thee, and thou seest the folly of thy heart, return hither to me, and I will give thee help." So the king of the hoopoes left the



presence of King Solomon with a golden crown upon his head. And all the hoopoes had golden crowns, and they were exceeding proud and haughty. Moreover, they went down by the lakes and the pools, and walked by the margin of the water, that they might admire themselves as it were in a glass. And the queen of the hoopoes gave herself airs, and sat upon a twig; and she refused to speak to the merops, her cousins, and the other birds who had been her friends, because they were but vulgar birds, and she wore a golden crown upon her head.

Now there was a certain fowler, who set traps for birds; and he put a piece of a broken mirror into his trap, and a hoopoe, that went in to admire itself, was caught. And the fowler looked at it, and saw the shining crown upon its head; so he wrung off its head, and took the crown to Issachar, the son of Jacob, the worker in metal, and he asked him what it was. So Issachar, the son of Jacob, said, "It is a crown of brass." And he gave the fowler a quarter of a shekel for it, and desired him, if he found any more, to bring them to him, and to tell no man thereof. So the fowler caught some more hoopoes, and sold their crowns to Issachar, the son of Jacob; until one day he met another man who was a jeweller, and he showed him several of the hoopoe's crowns. Whereupon the jeweller told him they were of pure gold, and he gave the fowler a talent of gold for four of them.

Now, when the value of these crowns was known, the fame of them got abroad, and in all the land of Israel was heard the twang of bows, and the whirling of slings; bird lime was made in every town; and the price of traps rose in the market, so that the fortune of the trap-makers increased.

Not a hoopoe could show its head but it was slain or



taken captive, and the days of the hoopoes were numbered. Then their minds were filled with sorrow and dismay, and before long few were left to bewail their cruel destiny.

At last, flying by stealth through the most unfrequented places, the unhappy king of the hoopoes went to the court of King Solomon, and stood again before the steps of the golden throne, and with tears and groans related the misfortunes which had happened to his race.

So King Solomon looked kindly upon the king of the hoopoes, and said unto him, "Did I not warn thee of thy folly, in desiring to have crowns of gold? Vanity and pride have been thy ruin. But now, that a memorial may remain of the service which thou didst render unto me, your crowns of gold shall be changed into crowns of feathers, that you may walk unharmed upon the earth." Now when the fowlers saw that the hoopoes no longer wore crowns of gold upon their heads, they ceased from the persecution of their race; and from that time forth the family of the hoopoes have flourished and increased, and have continued in peace even to the present day.

And here endeth the veracious history of the king of the hoopoes.

---

## LESSON XXXI.

### WAGES.

Em-bod-ied.

E-lec-tric.

Re-mem-bered.

Quan-ti-ties.

Me-chan-ic-al.

Ma-te-ri-als.

E-mol-u-ments.

Ar-ti-fi-cial.

In-ter-me-di-ar-ies.

In-di-vid-u-als.

Cir-cum-stan-ces.

Sep-a-ra-ted.

WHEN men do any kind of work, they generally move matter merely from one place to another, so that materials which before were unconnected are joined together, and others which before were joined are separated. A baker

brings particles of flour, water, butter, sugar, yeast, eggs, and other things together; removes them from the baking table to the oven; takes them out from the oven after a time; and then his cake is made. A tailor tears large pieces of cloth into small pieces; then puts these together in a certain way, and makes a needle pass through them at certain places, leaving a thread where it has passed; and so his coat is made. A night-watchman, by moving up and down on his beat, scares away rogues from honest men's houses. A teacher moves the air with his organs of voice, and so does a singer at a concert. A corn merchant brings corn in ships from one country to another. A retail shopkeeper carries goods in large quantities from the wholesale merchant's store to his own shop, and there divides them into small parcels, suitable for poor people and daily use. And so it might be shown that all work is only some mode of moving pieces of matter; whatever else is needed to make matter into goods fit for the use of men is done by what we call the forces of nature. Nay, it is with good reason that men think that all the wondrous works of nature—the changes which we call mechanical, or chemical, or electric—are themselves only modes of movement of exceedingly small particles of matter.

In doing these things we see that men render services to each other. The services of the baker are shut up, as it were, in the loaf; those of the tailor in the coat. Those whose services are thus embodied in some useful object, which can be seen and handed from one to another, are usually called *productive* labourers. But in what are the services of the night-watchman, the teacher, and the singer embodied? There is no material object in which they can be seen. Again, in what are the services of the corn importer, of the carrier, and of the

retail shopkeeper embodied? Not in the corn or in the contents of the parcel. These are the same in the country or town to which they are brought, as they were in that from which they were brought; and the same when divided into small, as when in large quantities. All of these men, whose services are not embodied in any useful material object, are called usually *unproductive* labourers—a most improper name, since it is clear they must have produced something of value, or men would not pay them for their labours. Their services, beyond a doubt, produce satisfaction of one kind or another—supply some want which men feel. The night-watchman gives us safety; the teacher, knowledge; the singer, pleasure; and a hungry man in Sydney, about to eat a cake, can easily tell you the want which the man has supplied who brought the flour from Adelaide in bags or barrels. To those who think that all labourers are productive or unproductive, the man who makes a fiddle is a productive labourer, while the man who plays upon it, no matter how sweetly, is an unproductive labourer. Those who, like the corn importer and the shopkeeper, convey goods that embody the services of others to the people who use or consume them, are sometimes called *intermediaries*. Their services come in between the production and the consumption of the goods, but still it should be remembered that they are not the less services for which men pay.

We are apt to think, when we buy and pay for a loaf, that it is the baker only whom we are paying, and that the value is something contained in the loaf itself; and so, when we buy a coat, we think we pay the tailor only, and that the value lies in the coat. But it is all the men who helped to make the loaf or the coat that we pay, and not merely the tailor or the baker; and it is the services

which are embodied in the loaf or the coat for which we pay, and not the loaf or the coat itself. In the loaf are shut up the services not only of the baker, but also of the miller, the sower, the reaper, the ploughman, and many others. In the coat are shut up the services not only of the tailor, but also of the weaver, spinner, wool-carder, sheep-farmer, and more than one can well name. And it is these we pay for, not the material object itself, except because it contains these, and could not be got by us without them.

There is hardly anything in social economy which it is more important that we keep in memory than this: that it is not things we pay for, but the services rendered to us in giving us these things—the trouble men have taken in producing them, and have saved to us who are the purchasers. We pay for neither the matter of the loaf, nor of the plant from which the flour that made the loaf came, nor for the living power of the plant, nor for the powers of the soil, or the air, or the sunshine which made the plant grow; we pay only for the services of those who took pains to enclose and cultivate the soil, and reared the plants in places where air and water and sunshine could get at them and nourish them. The powers of the soil and the air and the water are gifts of nature—given for nothing to those who first enclosed the ground, and which are given for nothing still, to all who will search for and enclose new lands, or who will expose plants where the air and sunshine can get at them. Such services have no value in the market, as is easily seen in regard to the air, the water, and the sunshine. It is only men's services which have a value; and the object of social economy is to increase the number of free services which nature can render us, and make needless those of men, which cost so much—to make nature work for us rather than men in increasing our wealth.

The price paid for all the services of all the men engaged in producing anything of value is called its *cost of production*; and the act of rendering these services is called *labour*. Labour, then, and the forces of nature, are the sources of all our wealth; from one or other of these, or from both united, come all the goods and services which any nation or individual can command. You will often hear it said that labour and land are the sources of wealth; but those who so speak of land mean by it all the powers of nature which the land is a means of bringing to act upon plants, or of hiding in minerals. To speak correctly, nature and labour are the sources of wealth, and the work of nature in the production of wealth is free, that of labour must be paid.

Every time that two articles of value are exchanged, men are really purchasing from each other services rendered by labour, and shut up in the things exchanged. Whether we buy goods, or pay performers, or pay carriage of goods, or a railway fare, it is really labour that we purchase. The buying of a loaf differs in nothing of importance from the engagement of a man to do work; and the man who asks for employment is doing the same thing in reality as the man who wants to sell his goods. The one seeks to sell labour directly, the other to sell it as contained in his goods.

Now, what is paid for labour of any kind is called *wages*. We are apt to speak of the payment given to the common day labourer only as wages; and we give finer names to the payments which are made for some other kinds of services. Thus we speak of the doctor's or the lawyer's fee; of the judge's salary; of the teacher's income; of the merchant's profit; of the banker's interest; and of the professor's emoluments. They are all, in reality, only payments for labour of different kinds, or



for different results of labour—that is, they are all wages.

Why are the wages of some men so very great, while others are so poorly paid; and why are the wages of the same man high at one time and lower at another? These questions can easily be answered by those who know why wild flowers can be got for nothing, and artificial flowers cost money. Whatever kinds of labour are easily got, because the labourers are numerous, for these little will be paid. Whatever kinds of labour are scarce, because those who can do such labour are not easily found, for these high wages will be paid. Let us consider then what circumstances make tradesmen of some kinds numerous, and of others scarce.

*First*, Few people like to work at a trade that is disagreeable—such as that of a chimney-sweeper, or a collier, or a needle-maker. The first is dirty, the second dirty and dangerous, and the third unhealthy. For this reason the number of such workmen is small, compared with the number of the people who require their services. The supply of such kinds of labour is small, and the demand for them great, for almost everybody requires needles, coals, and chimneys swept; therefore these trades are highly paid.

*Second*, Few people have the means of learning trades which require great skill, because few have the means of paying teachers of such kinds of work. The larger number of workmen are therefore obliged to go to some easily learnt trade. On this account there are comparatively few surgeons, or architects, or lawyers; but many ploughmen, weavers, coach-drivers, policemen, and the like. The services of the first are difficult to obtain, and therefore highly paid; the others are poorly paid, because, though their services are wanted, they are easily got.



*Third*, Few people like to enter trades in which employment is not constant, but liable to interruption from changes of season or from accidental causes:—therefore such trades are well paid.

*Fourth*, There are unfortunately but few men in whom great trust can be reposed; the services therefore of such are highly paid—as those, for example, of bankers, of confidential clerks, or of jewellers' assistants.

*Fifth*, Few men care to engage in a profession in which success is uncertain and rare. For this reason successful artists, actors, and book-writers earn enormous sums; but the route to success in such professions is strewn with the wrecks of those who have tried them and miserably failed.

---

## LESSON XXXII.

### WHAT IS A PLANT?

Ac-cus-tomed.  
Or-gan-isms.  
Gi-gan-tic.  
Eu-cal-yp-tus.

Con-sti-tutes.  
Es-sen-tial.  
Ac-quaint-ance.  
Par-a-sit-ic-al.

Nour-ish-ment.  
Eu-ro-pe-an.  
Es-cu-lent.  
Mi-cro-scope.

WE are accustomed to think of plants as living organisms rooted in the earth and possessing stems, branches, leaves, and flowers. Whether it be a lowly moss or a gigantic eucalyptus, some, at least, of these organs are supposed to be present in every plant. If, however, we were to restrict our notions of what constitutes a plant to those vegetable growths which spring from the ground and throw up stems and leaves, we should exclude not only a large number, but also some of the most striking and peculiar members of the vegetable kingdom. In the ordinary conception of a plant, its fixedness to one spot, and the absence of power of voluntary movement, are

essential conditions. We regard a tree as literally rooted to the spot in which it grows, and incapable of moving the tiniest leaf of its own accord. It may bow before the blast, which may bend its branches and shake its leaves, but the force producing these effects comes from without.

A wider acquaintance with the plant world would show us so many exceptions to the commonly received definition of a plant, as to compel us to look for a more precise description of its necessary qualities. Beginning with the root, we should discover many species of plants which have no apparent roots, but appear to spring from the roots or branches of other plants. In passing through the Australian "bush," for example, a plant may often be seen growing out of the branch of a eucalyptus or other tree, but differing entirely from it in appearance and, as would be seen on closer examination, in structure. This plant, like the mistletoe which springs out of the British oak, belongs to the class termed "parasites," which derive their nourishment, not from the earth, but from other plants. Parasites, though found in nearly all parts of the earth, are most common in the forests of tropical countries, where also they attain their greatest size and development. The parasitical plant first mentioned is, in fact, the Australian representative of the European mistletoe.

More striking still is the fact that some plants are not only destitute of roots, but that they do not even derive support or nourishment from other plants. Some aquatic, and especially marine plants, are of this kind. The well-known "gulf weed," for example, has never been found rooted, but floats about the ocean, being carried by winds and currents to various parts of the world. Its original home is supposed to be the Gulf of Mexico, from which

its name is derived, but it is found in immense quantities in the Atlantic Ocean, especially in that part called the Sargasso Sea, where it is sufficiently abundant to check the speed of vessels sailing in that locality. The gulf weed, of which there are two species, is also found in the Pacific and Indian Oceans.

Of plants which appear to possess neither root nor stem, the most remarkable is the *Rafflesia*, which is simply a flower and nothing more. This plant, a native of Sumatra, grows out of the roots of another plant of an entirely different kind. It throws up no stalk and puts forth no leaves; the flower rests upon the plant from which it draws its nutriment, and grows to an enormous size. Its diameter is three feet, and it is the largest of all flowers yet discovered.

Still more remote from the ordinary idea of a plant are the various tribes of *fungi*, of which the mushroom is a well-known example. The puff-balls sometimes found in our bush, generally in poor soil, and which seem to consist merely of skins filled with dry powder, are even less like plants, while the truffle, an esculent fungus found in France and other parts of Europe, bears little or no resemblance to a vegetable. To the same class of plants, the fungi, belong numerous vegetable organisms, so small as to escape notice, some, in fact, being invisible without the aid of a microscope. These cover damp and decaying surfaces, and make their presence known by the discolouration they cause; and some kinds may be distinguished in the mouldiness which affects our food, books, leather, and clothing. Others, in the form of what is called "dry-rot," destroy timber and wooden houses, and even ships. The smut, rust, and blight, which infest different plants, are also vegetable growths, though none of them would, at first sight, be recognised

as living members of the vegetable kingdom. The microscopic kinds of fungi float in the air or are diffused through the water, and are believed to cause serious diseases when breathed or swallowed. Naturalists were long divided in opinion regarding some of the microscopic species, some holding that they were vegetable, others that they were animal forms. The fact that they appeared to possess the power of voluntary motion seemed to prove that they were animals, but the view now generally entertained respecting them is that they are vegetables, that is, plants.

The absence of flowers is so commonly observed in the Australian ferns that it attracts little notice; nor do we regard them, on that account, as excluded from our list of plants, especially as they appear to possess stems and leaves. The tree ferns, in particular, sometimes grow to a great size, and are beautiful specimens of the vegetable race. On the other hand, besides fungi and ferns, there are other tribes of flowerless plants, some of which are of minute size and insignificant appearance. These are mosses, lichens, and sea-weeds. Of the latter, some are so small as to be invisible to the naked eye, while others grow to a great size, some attaining a length of several hundred feet.

The power of voluntary movement, though not a characteristic of plants, is possessed by a few, of which the sensitive plant is the most striking example. When touched, this plant appears to shrink from the object brought into contact with it, and closes its leaves, which open again after a short time. Those plants, which have been termed "carnivorous," have the power of shutting their leaves upon flies or other substances which alight upon them, and of drawing nourishment from such as belong to the animal

world. Other plants have the power of closing the flowers at night or in wet weather, and many project their ripe seeds to considerable distances. In contrast with these may be mentioned certain animals which, like the sea-anemone, are fixed to one place as securely as a tree.

To define a plant, as may be inferred from the preceding observations, is a matter of some difficulty, and requires far greater knowledge than is attainable by any but scientific men.

---

### LESSON XXXIII.

#### LORD MARMION AND HIS TRAIN.

Along the bridge Lord Marmion rode,  
Proudly his red-roan charger trode,  
His helm hung at the saddle-bow ;  
Well, by his visage, you might know  
He was a stalworth knight and keen,  
And had in many a battle been ;  
The scar on his brown cheek revealed  
A token true of Bosworth field ;  
His eyebrow dark and eye of fire  
Showed spirit proud and prompt to ire ;  
Yet lines of thought upon his cheek  
Did deep design and counsel speak,  
His forehead by his casque worn bare,  
His thick moustache and curly hair,  
Coal black and grizzled here and there,  
But more through toil than age ;  
His square-turned joints and strength of limb  
Showed him no carpet-knight so trim,  
But in close fight a champion grim,  
In camps a leader sage.



Well was he armed from head to heel  
In mail and plate of Milan steel ;  
But his strong helm of mighty cost,  
Was all with burnished gold embossed ;  
Amid the plumage of the crest  
A falcon hovered on her nest,  
With wings outspread and forward breast ;



E'en such a falcon, on his shield,  
Sowed sable in an azure field,  
The golden legend bore aright,  
"WHO CHECKS AT ME TO DEATH IS DIGHT."  
Blue was the charger's bridled rein ;  
Blue ribbons decked his arching mane ;  
The knightly housing's ample fold  
Was velvet blue and trapped with gold.



Behind him rode two gallant squires,  
Of noble name and knightly sires ;  
They burned the gilded spurs to claim ;  
Full well could each a war-horse tame,  
Could draw the bow, the sword could sway,  
And lightly bear the ring away ;  
Nor less with courteous precepts stored,  
Could dance in hall and carve at board,  
And frame love ditties passing rare,  
And sing them to a lady fair.

Four men-at-arms came at their backs,  
With halbert, bill, and battle-axe :  
They bore Lord Marmion's lance so strong,  
And led his sumpter mules along,  
And ambling palfrey when at need  
Him listed ease his battle-steed.  
The last and trustiest of the four  
On high his forky pennon bore ;  
Like swallow's tail, in shape and hue,  
Fluttered the streamer glossy blue,  
Where, blazoned sable, as before,  
The towering falcon seemed to soar.

Last, twenty yeoman, two and two,  
In hosen black and jerkins blue,  
With falcons broidered on each breast  
Attended on their lord's behest.  
Each, chosen for an archer good,  
Knew hunting-craft by lake or wood ;  
Each one a six-foot bow could bend,  
And far a cloth-yard shaft could send ;  
Each held a bow-spear tough and strong,  
And at their belts their quivers rung :  
Their dusty palfreys and array  
Showed they had marched a weary way.

---

## LESSON XXXIV.

## ECLIPSES.

Trans-pa-rent.	Con-junc-tion.	Com-plete-ness.
Ce-les-ti-al.	Ob-scu-ra-tion.	Car-ni-vor-ous.
Oc-cur-rence.	Du-ra-tion.	Lu-min-ous.
Cal-cu-la-tions.	Con-se-quent-ly.	Prom-in-en-ces.

The clear sky and transparent atmosphere of Australia are extremely favourable to the observation of the heavenly bodies, and, indeed, of all celestial phenomena. Comets, eclipses, and transit of planets across the sun's disk have accordingly been carefully watched, and our astronomers have been able to describe these matters with great accuracy. ✓

Both comets and eclipses were regarded in ancient times as portents of the direst calamities. The fate of armies has been determined by the occurrence of eclipses which, in the popular mind, were attributable to supernatural causes. Even at the present day the Chinese believe that the attempts of great dragons to swallow the sun and moon are the causes of eclipses, and barbarous nations generally regard these phenomena with alarm. On the other hand, most savages appear to regard them as matters of course, not worthy of particular notice. It is related of a Fijian that when his attention was called to an eclipse then happening, he merely remarked that it was "another white man's trick."

The causes of eclipses are thoroughly known, and the time when they will happen can be calculated with the most exact precision. It is also known that, according to the constitution of the solar system, there must be a certain number of eclipses every year. There cannot be less than two; four is the most usual number, and rarely

there are six, but there cannot be more than seven. A person living during the whole year in one place might not, however, be aware that an eclipse had taken place, for, owing to the earth's rotation, the sun might not be visible at the place where he resided, or in other words, the eclipse might take place at night.

Eclipses, as the word is commonly understood, are of two kinds,—eclipses of the sun, and eclipses of the moon. The essential condition in both cases is that the sun, moon, and earth shall be in the same straight line. There are other eclipses which, however, are as a rule observed by astronomers alone, such as the eclipses of planets and their satellites. These, although requiring the aid of telescopes for their proper observation, are nevertheless very interesting, and are, moreover, of great use in making certain calculations for the assistance of mariners and others.

When the sun, moon, and earth are in the same straight line, the moon may be between the sun and the earth. The moon is then said to be *in conjunction*, and this condition happens at the time of new moon. When the moon is on the other side of the earth, or in other words, when the earth is between the sun and the moon, she is said to be *in opposition*. This occurs at the time of full moon. Bearing in mind that an eclipse is an obscuration of a heavenly body by another coming between it and the sun, or between it and the observer, it is evident that there must be a beginning and an ending of the eclipse, as well as a period during which it continues. The beginning is the moment when the obscuration commences, and is called the *immersion*; the ending is the moment when the obscuration ceases, and is designated the *emersion*; and the period of time between these two is termed the duration of the eclipse.

Eclipses are described as total or partial; in the former the whole orb is hidden, in the latter only a portion.

Lunar eclipses always occur when the moon is at the full, but not at every full moon. In this case, the earth, passing between the sun and the moon, intercepts the light of the former and consequently casts a shadow upon the latter. It is matter of observation that the moon is never wholly deprived of the sun's light even in a total eclipse. Her appearance is greatly altered and her brightness dimmed, but she is always distinctly visible and does not cease to shine. Lunar eclipses are so much oftener visible from a large extent of the earth's surface, that ordinary observers erroneously imagine that they occur with greater frequency than eclipses of the sun. Scientific men know that this is impossible.

Eclipses of the sun occur when the moon is in conjunction. In those cases, as the moon's light is derived from the sun, her shadow is thrown upon the earth; and a solar eclipse is a different kind of eclipse from that of the moon. The solid body of the moon coming between the earth and the sun, hides the whole or portion of the latter, and with more or less completeness, prevents his light from reaching the earth. When such an eclipse takes place at a time when the spectator is not looking for it, the impression produced upon his mind is striking. The sudden darkening, it may be at noon-day, is calculated to excite terror. The lower animals act as if night were approaching in reality. Cattle return to their usual resting places and birds to their nests, while the carnivorous beasts that seek their prey by night, rouse themselves from their lairs. But when the eclipse is past, the order of things is reversed, and the bewildered animals resume their ordinary habits.

The close observation of solar eclipses has revealed

some startling facts in connection with the constitution of the sun. At such times there is visible round the sun and moon a luminous ring or "corona," and from behind the dark edge of the moon, bright red prominences project to a considerable distance. Scientific investigations have rendered it a matter of extreme probability, if not of certainty, that these red prominences are caused by hydrogen in a burning condition. They are occasionally seen to shoot up like flames of fire to heights estimated at seventy thousand miles.

All the phenomena connected with eclipses, the certainty with which their occurrence can be predicted, and the grandeur of the scale upon which they are produced, are calculated to impress upon the beholder a feeling of awe at the vast mechanism of the universe and of the forces by which it is moved and regulated.

---

### LESSON XXXV.

#### THE THERMOMETER.

El-e-men-tary.	Ac-cu-rate.	Grad-u-a-tion.
At-mo-sphere.	En-large-ment.	Con-sec-u-tive.
Ther-mom-e-ter.	Com-par-i-son.	Cap-il-la-ry.
Tem-per-at-ure.	Her-met-ic-al-ly.	Fer-ment-a-tion.

It has long been one of the elementary facts of science that heat causes all bodies to expand, though all are not affected alike. When the heat applied to any body is withdrawn, that body returns to its original dimensions. For example, if an iron rod be made red hot, it will increase in length, as could be tested by measurement; but if left to cool and then again measured, it is found to have resumed its original length. In the same way, decrease of heat will cause bodies to shrink or become smaller until the usual temperature is restored. Some

bodies expand by regular degrees, according to the amount of heat applied. In these instances, each successive degree of heat causes an equal increase in the bulk of the object operated upon. Advantage is taken of these natural laws, in the construction of instruments by which the amount of heat in the atmosphere, in the earth, in the human body, or in the bodies of animals may be measured.

The degree of heat in the atmosphere is called its *temperature*. We also speak of the temperature of the earth, or of our bodies. It is common also to speak of high temperatures and low temperatures. Steam, for example, when employed to work an engine must have a high temperature. The temperature of molten iron is higher still. A very low temperature is unknown in Australia, notwithstanding the occasional presence of frost and snow. Compared with such countries as Labrador and Greenland, where the temperature in winter is so low that mercury becomes solid, Australia may be called a hot country, though even here chemists can produce an intense degree of cold by artificial means. These remarks show the necessity for some means of measuring temperature, so that an accurate account can be kept of its variations in different bodies, and also for the sake of comparison.

Such a means of measuring heat or temperature is found in the little instrument called the thermometer. It consists of a glass tube fixed in a wooden frame. The tube, which must have a very fine bore, and which for that reason is called a capillary tube, is open at one end, and at the other has an enlargement called the bulb. This tube is partially filled with some fluid known to expand and contract regularly according to the heat applied, and the air having been expelled therefrom, the open end is closed and sealed hermetically, that is, in



such a manner that neither air nor any other substance can enter. The fluids most commonly used are mercury and spirits of wine, the latter being usually coloured; but other fluids, such as ether and sulphuric acid, are sometimes employed, according to the purpose for which the thermometer is designed. Water would be a most unsuitable fluid for a thermometer, inasmuch as it expands unequally in different degrees of heat, and at certain temperatures expands when the heat is lessened.

The next step is to graduate the thermometer, that is, to mark on the tube or on the wooden frame a series of equal divisions with consecutive numbers. There are several modes of graduation. That in common use is termed Fahrenheit's, from the name of the inventor. In carrying out the process of graduation it is necessary to fix upon two points, the freezing point and the boiling point of some suitable substance, and for this purpose water is usually employed. When these two points are determined and marked upon the tube or frame, the space between them is divided into a certain number of equal lengths, which are termed degrees. The whole of the marks constitute the scale of the thermometer. In Fahrenheit's, the freezing point of water is fixed at 32 degrees, represented as usual by  $32^{\circ}$ , and the boiling point at  $212^{\circ}$ . Small thermometers, however, seldom have so extended a scale, but provide for not more than  $100^{\circ}$ .

To determine the freezing point, the bulb with the portion of the tube containing the fluid, which we will assume to be spirit, is placed in pounded ice just on the point of melting. The cold causes the spirit to shrink and descend in the tube. When the spirit has fallen as low as it seems likely to fall, a mark is made on the scale—this is the freezing point. The fixing of the boiling point is a more difficult operation, because that point is affected by the

pressure of the atmosphere. Thus it is found that at great heights water boils at a lower degree of temperature than at the level of the sea. It is necessary, therefore, that in fixing the boiling point, the pressure of the air should be at its usual standard, or  $30^{\circ}$  by the barometer. This secured, the bulb is exposed to steam rising from the surface of water boiling in an open vessel. The heat causes the spirit to expand and rise in the tube. When the spirit has risen to the level where it seems stationary, another mark is made, which is the boiling point. The distance between the boiling point and the freezing point in Fahrenheit's thermometer is divided into 180 degrees.

The uses of the thermometer are so numerous and so varied that a volume might be written on the subject. A few of the more common may, however, be noticed. The most frequent use, perhaps, that is made of the instrument is to point out the temperature of the air. We sometimes say vaguely, "It is a hot day," when we are judging by our own feelings rather than by the real state of the atmosphere, and we are surprised to find that on such an occasion the thermometer marks but a very moderate temperature. No doubt our feelings are real enough, but our sensations of heat and cold depend upon other circumstances as well as the temperature of the air. We may even feel chilly when the thermometer indicates no fall in the atmospheric temperature, and we have then to look to some other circumstance for the explanation of our feelings.

If a farmer wishes to know if the weather is warm enough to ripen his crop of maize, the thermometer will give him the desired information. If the occupant of an orchard desires to ascertain the chances of his young fruit surviving a hot wind, he may consult his thermometer. So if the vine grower perceives that the fermen-

tation of his grape juice is proceeding too rapidly and too violently, he observes the indications of the thermometer, and takes steps to reduce the temperature of his cellar.

A skilful physician will sometimes make use of a thermometer when he suspects the existence of fever or some other serious disorder in the patient. The usual temperature of the human body, that is, of the blood, is  $98^{\circ}$  of Fahrenheit's thermometer, though the skin, and especially the exposed surfaces, are much colder. When a fever attacks a person his blood becomes hotter, and the thermometer, if placed for a few minutes in some convenient place, such as one of the armpits, would indicate a temperature some degrees higher than  $98^{\circ}$ . In such a case the thermometer is of great assistance, and enables the physician to determine what course of treatment he will pursue for the patient's recovery. Again, if it should be necessary to place a little child in a warm bath, the temperature of the water used must be nicely adjusted, so that it may be precisely of the right heat, and this object the thermometer enables us to accomplish.

---

## LESSON XXXVI.

## THE BATTLE OF FLODDEN.

ENCAMPED on Flodden edge:

The white pavilions made a show,  
Like remnants of the winter snow,

Along the dusky ridge.

Lord Marmion looked:—at length his eye  
Unusual movement might descry

Amid the shifting lines:

The Scottish host drawn out appears,  
For, flashing on the hedge of spears,  
The eastern sunbeam shines.

Their front now deepening, now extending;  
Their flank inclining, wheeling, bending,  
Now drawing back, and now descending,  
The skilful Marmion well could know  
They watched the motions of some foe,  
Who traversed on the plain below.  
Even so it was. From Flodden ridge  
The Scots beheld the English host  
Leave Barmore-wood, their evening post,  
And heedful watched them as they crossed  
The Till by Twisel Bridge.  
High sight it is, and haughty, while  
They dive into the deep defile;  
Beneath the caverned cliff they fall,  
Beneath the castle's airy wall.  
By rock, by oak, by hawthorn-tree,  
Troop after troop are disappearing;  
Troop after troop their banners rearing,  
Upon the eastern bank you see.  
Still pouring down the rocky den,  
Where flows the sullen Till,  
And rising from the dim-wood glen,  
Standards on standards, men on men,  
In slow succession still,  
And, sweeping o'er the Gothic arch,  
And pressing on, in ceaseless march,  
To gain the opposing hill.  
That morn, to many a trumpet-clang,  
Twisel! thy rock's deep echo rang;  
And many a chief of birth and rank,  
Saint Helen! at thy fountain drank;  
Thy hawthorn glade, which now we see  
In spring-tide bloom so lavishly,  
Had then from many an axe its doom,  
To give the marching columns room.  
And why stands Scotland idly now,  
Dark Flodden! on thy airy brow,  
Since England gains the pass the while,  
And struggles through the deep defile!

What checks the fiery soul of James?  
Why sits that champion of the dames  
Inactive on his steed,  
And sees, between him and his land,  
Between him and Tweed's southern strand,  
His host Lord Surrey lead?  
What 'vails the vain knight-errant's brand?—  
O Douglas, for thy leading wand!  
Fierce Randolph, for thy speed!  
O for one hour of Wallace wight,  
Or well-skilled Bruce, to rule the fight,  
And cry—"Saint Andrew and our right!"  
Another sight had seen that morn,  
From Fate's dark book a leaf been torn,  
And Flodden had been Bannockburn!—  
The precious hour has passed in vain,  
And England's host has gained the plain;  
Wheeling their march, and circling still,  
Around the base of Flodden-hill.  
But see! look up!—on Flodden bent,  
The Scottish foe has fired his tent.  
And sudden, as he spoke,  
From the sharp ridges of the hill,  
All downward to the banks of Till,  
Was wreathed in sable smoke.  
Volumed and fast, and rolling far,  
The cloud enveloped Scotland's war,  
As down the hill they broke:  
Nor martial shout nor minstrel tone  
Announced their march; their tread alone—  
At times one warning trumpet blown,  
At times a stifled hum—  
Told England from his mountain-throne  
King James did rushing come.  
Scarce could they hear or see their foes,  
Until at weapon-point they close.—  
They close, in clouds of smoke and dust,  
With sword-sway and with lance's thrust;  
And such a yell was there,

Of sudden and portentous birth,  
As if men fought upon the earth,  
And fiends in upper air!  
Oh, life and death were in the shout,  
Recoil and rally, charge and rout,  
And triumph and despair!  
Long looked the anxious squires; their eye  
Could in the darkness nought descry.  
At length the freshening western blast  
Aside the shroud of battle cast;  
And, first, the ridge of mingled spears  
Above the brightening cloud appears;  
And in the smoke the pennons flew,  
As in the storm the white sea-mew.  
Then marked they, dashing broad and far,  
The broken billows of the war,  
And plum'd crests of chieftains brave,  
Floating like foam upon the wave;  
But nought distinct they see.  
Wide raged the battle on the plain;  
Spears shook, and falchions flashed amain;  
Fell England's arrow-flight like rain;  
Crests rose, and stooped, and rose again,  
Wild and disorderly.  
As they left the dark'ning heath,  
More desperate grew the strife of death.  
The English shafts in volleys hailed,  
In headlong charge their horse assailed:  
Front, flank, and rear, the squadrons sweep,  
To break the Scottish circle deep,  
That fought around their King.  
But yet, though thick the shafts as snow,  
Though charging knights like whirlwinds go,  
Though billmen ply the ghastly blow,  
Unbroken was the ring;  
The stubborn spearmen still made good  
Their dark impenetrable wood,  
Each stepping where his comrade stood,  
The instant that he fell.



No thought was there of dastard flight;  
Linked in the serried phalanx tight,  
Groom fought like noble, squire like knight,  
As fearlessly and well;  
'Till utter darkness closed her wing  
O'er their thin host and wounded King.  
Then skilful Surrey's sage commands  
Led back from strife his shattered bands;  
And from the charge they drew,  
As mountain-waves, from wasted lands,  
Sweep back to ocean blue.  
Then did their loss his foemen know;  
Their King, their Lords, their mightiest, low,  
They melted from the field as snow—  
When streams are swoln and south winds blow—  
Dissolves in silent dew.  
Tweed's echoes heard the ceaseless plash,  
While many a broken band,  
Disordered, through her currents dash,  
To gain the Scottish land;  
To town and tower, to down and dale,  
To tell red Flodden's dismal tale,  
And raise the universal wail.  
Tradition, legend, tune, and song,  
Shall many an age that wail prolong:  
Still from the sire the son shall hear  
Of the stern strife, and carnage drear,  
Of Flodden's fatal field,  
Where shivered was fair Scotland's spear,  
And broken was her shield!  
Day dawns upon the mountain's side:  
There, Scotland! lay thy bravest pride,  
Chiefs, knights, and nobles, many a one:  
The sad survivors all are gone.  
View not that corpse mistrustfully,  
Defaced and mangled though it be;  
Nor to yon Border castle high  
Look northward with upbraiding eye;  
Nor cherish hope in vain,

That journeying far on foreign strand,  
 The Royal Pilgrim to his land  
 May yet return again.  
 He saw the wreck his rashness wrought;  
 Reckless of life, he desperate fought,  
 And fell on Flodden plain:  
 And well in death, his trusty brand,  
 Found clenched within his manly hand,  
 Beseemed the monarch slain.

---

### LESSON XXXVII.

ROBERT CLIVE.

Dip-lo-ma-tic.	As-so-ci-a-tion.	Pre-serv-a-tion.
Con-sol-id-ate.	Mer-chand-ise.	Sur-ren-dered.
In-clin-a-tion.	Ex-pe-di-tion-a-ry.	Ne-go-ti-a-tion.

It is not many years since Her Majesty, Queen Victoria, was proclaimed Empress of India, though the British possessions in that wonderful land had long been spoken of as "our Indian Empire." How that empire was first acquired, by what exercise of military and diplomatic skill it was extended and consolidated, by what courage and endurance it was held and preserved—these are questions which few subjects of the queen would be disposed to regard lightly, and which have a special interest for Australians on account of the relations subsisting between the two countries in the early days of colonial history. The remarkable man whose life forms the subject of this lesson was the original founder of that Indian Empire.

Clive was born more than a hundred and fifty years ago, at a little village in Shropshire, an English county. While at school he was by no means a model pupil, being of too restless a disposition to give much attention to learning. At the same time, he displayed astounding

courage for his years ; but this quality, combined with his want of inclination to study, sometimes led him into mischief. For example, it is related of him that, to the terror of his parents and all other beholders, he climbed a lofty steeple, and seated himself near the top. At the numerous schools he attended, he failed to make satisfactory progress, and was generally regarded as a very stupid as well as a very bad boy, though one of his teachers foretold that he would some day achieve greatness.

As he grew up and approached man's estate, his parents were naturally solicitous about his future. What could be done for, or with, an ill-tempered dunce was a question difficult to answer. When, therefore, in his eighteenth year, a clerkship in the service of the East India Company was offered him, they eagerly took advantage of the opportunity, and he was speedily despatched to Madras, the place in which he was to be employed. At that time, the company was but an association of traders, occupying in India but a few miles of territory, which were rented from the native rulers ; and the business of their clerks was to look after the merchandise and keep accounts. This occupation, miserably paid as it was, suited Clive's temperament no better than study at school. He spent some time in reading, but his health gave way, and he was steeped in poverty. But no misfortune could subdue his courage or his pride. Besides fighting a duel, he insulted his superiors, and thereby risked the loss of his situation. Reduced to a condition of despair, he twice attempted to destroy himself and failed. Strange to say, his repeated failure revived his courage, and he appears to have nerved himself for further sufferings and continued endurance.

The breaking out of war between France and England, and the capture of Madras by a French expeditionary

force, afforded him the opportunity of changing his occupation; and, being then twenty-one years old, he became a soldier. In his new profession, besides distinguished courage, Clive manifested other qualities which he had not before been believed to possess, such as discretion and respect for authority. A few years passed before any occasion presented itself for the full display of his powers, but it came at last, when the governing body of the company determined, as a measure of self-preservation, to declare war against the Nabob of Arcot. A plan prepared by Clive was agreed to, and he was entrusted with its execution. At the head of two hundred British soldiers and three hundred sepoys, he marched against Arcot, which surrendered without a struggle.

After a time the fugitive garrison, aided by other soldiers from the neighbourhood, and amounting to three thousand men, returned with the purpose of besieging the town. With unabated courage, Clive attacked them by night, and completely routed them without the loss of a man. The Nabob, upon the receipt of this intelligence, at once despatched an army of ten thousand men, including a hundred French soldiers from Pondicherry, to lay siege to the captured town. Clive's army was by this time reduced by about one-half; they had but a small store of provisions, and the defences of the town were apparently untenable. The siege was prosecuted with vigour, but the little garrison held out heroically, and displayed the strongest proofs of confidence in their leader, whom neither threats nor bribes could move from his purpose. Thrice the besiegers rushed to the assault, and were as often repelled with loss. Next day they had vanished. Clive, reinforced with nine hundred men, pursued them, and after a fierce contest,

completely routed them. Further successes raised Clive's reputation as a commander, until he was generally admitted to be the only general who could uphold the company's cause in India.

Impaired in health from the effects of the climate, Clive determined to visit England, where he was received with great honour. After a time, however, he found it necessary to return to India, and, as signs were not wanting of an impending war between France and England, the directors of the East India Company appointed him to a command in the Madras territory. He had not long reached the seat of his government, when intelligence reached him of the capture of Calcutta by the Nabob of Bengal, and the horrible death of one hundred and twenty-three Europeans in the notorious Black Hole, in which they were confined by the conqueror's guards. The news had no sooner been received in Madras than it was determined to send out an expedition to recover Calcutta, and to punish a ruler who had shown such a treacherous and bloodthirsty spirit.

The command of the land forces, which consisted of two thousand four hundred men, including nine hundred English, was given to Clive. Delayed by contrary winds, considerable time elapsed before the expedition arrived in the Hoogley, but Clive lost no time in entering upon his work. The native garrison was speedily defeated and Calcutta retaken.

The Nabob alarmed, now wished to make terms with the English; and Clive, fully aware of the character of his antagonist for subtlety and treachery, resolved to meet him with the same weapons. Although doubtless prompted by good motives, Clive's conduct at this juncture has been condemned even by his best friends and



greatest admirers. He acted with more than oriental duplicity, and it is no excuse for his proceedings to point out that the Nabob had been equally faithless throughout. In the midst of all the intrigues carried on by each party, Clive resolved to strike a sudden blow, and, in conjunction with Admiral Watson, he attacked the French settlement at Chandernagore, and captured the fort, the garrison, and all the military equipment and stores.

After some further negotiations, equally insincere probably on both sides, the Nabob assembled his whole army at a place called Plassey. His forces amounted to fifty-five thousand men and more than fifty guns, while Clive had not more than three thousand under his command. At first he hesitated to engage the enemy with such a disparity of numbers, but finally resolved to venture upon a battle. The result was stupendous. The great army of nearly sixty thousand men was completely routed. In their flight the Nabob's troops left everything to the victors, who lost but twenty-two men. This battle, named after Plassey, virtually decided the war, and established the East India Company as masters of a large Indian territory. The effect upon the minds of the natives of India was that Clive was regarded as invincible, and no army raised by them ever dared to face him in battle.

Subsequently, the Dutch, who had held secret negotiations with the native authorities, fitted out an expedition, ostensibly to join the garrison of their own settlement at Chinsurah, in reality to check the growth of British power in India. With his usual boldness and promptitude Clive attacked this expedition, though superior in numbers to his own troops, and gained a complete victory. He next besieged Chinsurah, and forced the



authorities to agree to the terms he proposed. The English settlements were thus freed from all enemies whose presence could be regarded as dangerous.

It is not intended to narrate in detail the remaining steps in Clive's career. One of the obvious lessons from his life is the fact every person may, if he will, find a suitable position for the exercise of his talents. A boy may be a poor scholar, and grow up to be an inefficient clerk, but he may nevertheless enter upon some more congenial occupation, and follow it with advantage to himself, with credit to his friends, and with usefulness to society.

On his return to England with a large fortune, Clive was again received with the highest honour. He was made a peer, and lived for some time as one of the most distinguished men of his day. His latter years were embittered, however, by the attacks of his enemies, who made some of his errors the excuse for assailing him in the most vindictive fashion; and although he was in a measure practically acquitted of the charges brought against him, the effect upon his mind was serious, and in the end he terminated his life with his own hand.

In spite of his mistakes, there is no doubt that Lord Clive was one of the greatest men of his time as a soldier and as a statesman.

---

### LESSON XXXVIII.

#### NOW IS THE TIME.

THE bud will soon become a flower,  
The flower become a seed;  
Then seize, O youth! the present hour—  
Of that thou hast most need.

Do thy best always—do it now—  
For, in the present time,  
As in the furrows of a plough  
Fall seeds of good or crime.

The sun and rain will ripen fast  
Each seed that thou hast sown ;  
And every act and word at last  
By its own fruit be known.

And soon the harvest of thy toil  
Rejoicing thou shalt reap ;  
Or o'er thy wild, neglected soil  
Go forth in shame to weep.

---

If fortune with a smiling face  
Strew roses in our way,  
When shall we stoop to pick them up ?  
To-day, my friend, to-day.  
But should she frown with face of care,  
And talk of coming sorrow,  
When shall we grieve, if grieve we must ?  
To-morrow, friend, to-morrow.

If those who've wronged us own their fault,  
And kindly pity pray,  
When shall we listen and forgive ?  
To-day, my friend, to-day.  
But if stern justice urge rebuke,  
And warmth from memory borrow,  
When shall we chide, if chide we dare ?  
To-morrow, friend, to-morrow.

If those to whom we owe a debt  
Are harmed unless we pay,  
When shall we struggle to be just ?  
To-day, my friend, to-day.

But if our debtor fail our hope,  
 And plead his ruin thorough,  
 When shall we weigh his breach of faith?  
 To-morrow, friend, to-morrow.

For virtuous acts and harmless joys  
 The minutes will not stay;  
 We've always time to welcome them  
 To-day, my friend, to-day.  
 But care, resentment, angry words,  
 And unavailing sorrow,  
 Come far too soon, if they appear  
 To-morrow, friend, to-morrow.

---

BE wise to-day; 'tis madness to defer;  
 Next day the fatal precedent will plead,  
 Thus on till wisdom is pushed out of life.  
 Procrastination is the thief of time;  
 Year after year it steals, till all are fled,  
 And to the mercies of a moment leaves  
 The vast concerns of an eternal scene.

\* \* \* \* \*

All men think all men mortal but themselves;  
 Themselves, when some alarming shock of fate  
 Strikes through their wounded hearts the sudden dread.  
 But their hearts wounded, like the wounded air,  
 Soon close; where, past the shaft, no trace is found.  
 As from the wing no scar the sky retains,  
 The parted wave no furrow from the keel,  
 So dies in human hearts the thought of death:  
 Even when the tender tear which nature sheds  
 O'er those we love, we drop it in their grave.

## LESSON XXXIX.

## NEEDFUL REST.

Mod-er-ate.	Dis-tin-guish-a-ble.	Im-pe-ri-ous-ly.
Ex-pe-ri-ence.	Or-din-ar-i-ly.	Con-se-quence.
Oc-cu-pa-tion.	In-ter-rup-tion.	Qui-es-cence.
An-a-tom-ist.	Vol-un-ta-ry.	Ap-pro-pri-ate-ly.

AFTER taking exercise, even to a moderate extent, most people experience some degree of inability to continue the exertion with pleasure to themselves, as well as a desire either to cease from all activity or to change from the occupation in which they have been engaged to another. This feeling is called fatigue, and the desire is for rest. The more violent the exercise or the longer it is continued, the more urgent will be the demand of the bodily system for rest. The demand sometimes becomes irresistible, and men have been known, after severe and protracted labour, to fall asleep in spite of their most strenuous endeavours to keep awake, and of their knowledge that they expose their lives to great danger by snatching even a few moments' repose.

To understand fully how this need for rest is produced, it is necessary to have some little knowledge of the "nervous system." Besides the bony and fleshy parts of the body, which are visible to the eye or palpable to the touch, there is another that cannot usually be discerned by either of these senses, but which an anatomist with his instruments can lay bare, and render easily distinguishable. It is then seen that there are masses, cords, and threads or fibres, consisting of a substance which is neither bone nor flesh, and is quite unlike both. The principal mass forms the brain; the greatest cord runs completely through the whole length of the back-

bone, being for that reason called the "spinal cord" or the "spinal marrow"; and the threads or fibres permeate the whole body. Every organ has its special threads or nerves, as they are called, and cannot properly perform its functions unless these nerves are in a healthy condition. The office of these nerves is to stimulate the muscles, so that by contracting or relaxing they shall perform certain motions. Activity of the nervous system therefore implies life; while ceasing to act, either wholly or in part, results in total or partial death. All the motions of our limbs or muscles of which we are ordinarily conscious are the effects of the *will* acting through the nerves. There are, however, organs, such as the heart and lungs, which perform their functions independently of the will. These organs never become *tired*; they continue their work night and day, year after year without interruption, unless in cases of sickness. We know nothing of their work until our attention is drawn to them, and if we attempted to arrest their operation we should fail. If the motion of the heart or lungs depended upon our will, we could not sleep lest these organs should be forgotten, cease their action, and thus cause death. In their case no rest is required.

It is otherwise with the organs controlled by the voluntary nerves—those nerves, that is to say, which obey the will. After a long march, the muscles of the legs become more and more incapable of responding to nervous stimulus, and the nerve power itself grows weaker. Similarly, the arms after carrying a heavy load lose their power to make any great effort. In both cases the limbs require rest. We may even go further, and point out how the brain itself, the centre and origin of voluntary nervous stimulus, becomes exhausted of its nerve power, and imperiously demands repose, the denial

of which is liable to be followed by serious consequences.

There are several modes in which rest may be taken. In the first place, simply discontinuing the exercise of that part of the body which has been previously in the highest condition of activity, will afford welcome rest. After a fatiguing walk, for example, a person may not be disabled from rowing a boat, and may find in that exercise a sufficient amount of rest for the tired limbs. Simply sitting down may give an equal amount of rest, and this is what people usually understand by rest. Partial rest may also be secured by change of occupation. Bodily fatigue may be gradually removed by ceasing from bodily exertion and reading an interesting book, and a tired brain may be relieved, if not over-tired, by taking a pleasant walk. All these modes of resting are such as may be practised during the day, and would be out of place at night.

In the natural day, however, there comes a period when every one feels the need of rest. Whether toiling with brain or muscle, or simply leading an idle life, the nervous system will suffer more or less exhaustion, and will require, by a period of inaction, time to restore itself and acquire renewed vigour. This period of absolute rest, of perfect quiescence of the voluntary nerves and the muscular system, is termed "sleep," and it is most naturally and most appropriately obtained by night. In perfect health sleep is calm and untroubled, the functions of respiration and circulation are performed easily and regularly, and the conscious action of the brain is suspended. The effete matter in nerve and muscle is removed and replaced by new and living particles, so that after a sufficient period both are renewed and reinvigorated.



The duration of necessary sleep in the case of any individual depends upon his constitution, temperament, and occupation. A person possessing a sound healthy constitution falls asleep naturally, rests perfectly, and rises in the morning thoroughly refreshed and ready for his work. A sickly person, on the other hand, finds a difficulty in composing himself to sleep, his rest is imperfect, and he consequently requires a longer period in which to obtain the necessary renovation of nervous and muscular energy. Again, persons of what is called a nervous temperament expend in their work a greater amount of nerve power than those who are differently constituted. They appear to put into their work the whole force of their being; they work at high pressure. They are, in consequence, more quickly and more thoroughly exhausted, and demand a longer period of repose. Persons whose occupation is of an intellectual kind require more rest than those who labour with their hands. The brain uses up a large quantity of arterial blood in the process of thinking, and expends at the same time a great amount of nerve power, which cannot be replaced except during the time of perfect rest. As a general rule, it may be assumed that a healthy man engaged in manual labour will require eight hours' sleep, while a professional man, if fully employed, will find that not less than nine or ten hours will suffice.

How to secure sleep is often a troublesome problem to solve, and many plans have been suggested with a view to remove the difficulties which lie in the way. Most frequently the persons who are troubled with sleeplessness are those who follow sedentary occupations, or whose minds are exhausted with the worries of business or the exertion of prolonged study. In these cases, it may also be said that the *habit* of wakefulness has been established

before any proper attempt has been made to cure it, and to produce a disposition to sleep immediately on retiring for the night. Medical and other occasional remedies may give relief for a time, but the only permanent cure is to habituate the system to desire repose at fixed times—in short, to form the habit of sleeping.

On the other hand, some persons form the habit of sleeping too much. In this lesson we are considering needful, that is, necessary rest. No rest can be deemed needful that has not been earned by some exercise of mind or body. The consequences of indulging in rest without such exercise are injurious in a twofold sense. The nourishment taken into the system, not being removed by a sufficient amount of exertion, accumulates in the body in the shape of fat which encumbers the limbs, presses upon the internal organs, and impedes their free action. Bad health in some form is sure to follow ; and if you see a person of unwieldy size, you may be sure—if his stoutness does not arise from constitutional causes—that he eats and sleeps too much, and takes too little exercise. A worse evil than grossness of body may ensue when the desire to rest unnecessarily, that is, without sufficient exercise, is much indulged in, for then the habit of *laziness* is formed. A lazy man will probably injure himself and his prospects, and is very likely to injure others. His own interests, as well as his duties, will be neglected or improperly discharged ; and in extreme cases poverty, vice, and even crime are the results.

All these considerations should teach us self-control. We should learn to moderate our wishes and inclinations so as to keep them within the rule of our judgment, and so endeavour to secure perfect health of our mental as well as our physical endowments.

## LESSON XL.

## APOSTROPHE TO THE OCEAN.

THERE is a pleasure in the pathless woods,  
There is a rapture on the lonely shore,  
There is society where none intrudes  
By the deep sea, and music in its roar.  
I love not man the less, but nature more,  
From these our interviews, in which I steal  
From all I may be, or have been before,  
To mingle with the universe, and feel  
What I can ne'er express, yet can not all conceal.

Roll on, thou deep and dark blue ocean, roll !  
Ten thousand fleets sweep over thee in vain ;  
Man marks the earth with ruin ; his control  
Stops with the shore ; upon the watery plain  
The wrecks are all thy deed, nor doth remain  
A shadow of man's ravage, save his own,  
When, for a moment, like a drop of rain,  
He sinks into thy depths with bubbling groan,  
Without a grave, unknelled, uncoffined, and unknown.

The armaments which thunderstrike the walls  
Of rock-built cities, bidding nations quake,  
And monarchs tremble in their capitols,  
The oak leviathans whose huge ribs make  
Their clay creator the vain title take  
Of lord of thee, and arbiter of war ;—  
These are thy toys, and, as the snowy flake,  
They melt into thy yest of waves, which mar  
Alike the Armada's pride or spoils of Trafalgar. ,

Thy shores are empires, changed in all save thee,  
Assyria, Greece, Rome, Carthage, what are they ?  
Thy waters wasted them while they were free,  
And many a tyrant since ; their shores obey

The stranger, slave, or savage ; their decay  
Has dried up realms to deserts : not so thou,  
Unchangeable, save to thy wild waves' play ;  
Time writes no wrinkle on thine azure brow ;  
Such as creation's dawn beheld, thou rollest now.

Thou glorious mirror, where the Almighty's form  
Glasses itself in tempests , in all time,  
Calm or convulsed—in breeze, or gale, or storm—  
Icing the pole, or in the torrid clime  
Dark-heaving , boundless, endless, and sublime —  
The image of eternity—the throne  
Of the invisible , even from out thy slime  
The monsters of the deep are made ; each zone  
Obeys thee ; thou goest forth, dread, fathomless, alone.

And I have loved thee, Ocean ! and my joy  
Of youthful sports was on thy breast to be  
Borne, like thy bubbles, onward : from a boy  
I wantoned with thy breakers : they to me  
Were a delight ; and if the freshening sea  
Made them a terror, 'twas a pleasing fear,  
For I was, as it were, a child of thee,  
And trusted to thy billows far and near,  
And laid my hand upon thy mane, as I do here.



## LESSON XLI.

## THE SIMOOM.

Con-tin-u-ance.	Dis-cour-age-ment.	Bed-ou-in.
In-ten-si-ty.	In-vig-or-a-ting.	Pre-mat-ure.
Vi-o-lence.	Pes-til-en-tial.	In-ter-ro-ga-ted.
Con-se-quen-ces.	Ex-ag-ger-a-tion.	Op-press-ive-ness.

AUSTRALIANS are familiar with the hot winds which, during the summer months, occasionally cause loss and inconvenience to all within reach of their influence. Their dry, hot, parching effect upon the human frame has been felt by all who, during their continuance, have been under the necessity of quitting the shelter of the house. Doubtless the lower animals suffer in the same way, and it is not uncommon for birds and other small animals to be found dead, after a hot wind has blown with more than ordinary intensity or violence. If the mischief thus produced were limited to damage of this kind, there would be but little reason to complain. There are, however, more serious consequences to record. Grass and herbage are dried up and lose their nutritive qualities, so that, to the great loss of the grazier, cattle are deprived of wholesome food. Crops, if not burnt up and destroyed by the hot blast, are made sickly and comparatively unproductive, and are furthermore retarded in their growth and progress towards maturity. The gardener suffers no less than the farmer, for he finds his choicest vegetables perish in a day, and the whole prospects of a season lost. Though his loss may not be so serious, the lover of flowers, who has given time, and thought, and loving care to the culture of his floral favourites, sees with disappointment and discouragement that, after a day's hot wind, they have faded and withered beyond hope of recovery.



While a hot wind is blowing, the appearance of the atmosphere is peculiar. The air loses its usual transparency, and eventually becomes charged with dust, sometimes fine, but often coarse and heavy. Through this medium the sun appears like a fiery red disc, and his rays fill the whole atmosphere with an obscure but oppressive light. Owing, perhaps, to the presence of dust in the air, the temperature rises greatly beyond the usual summer heat, and the clear, invigorating, Australian atmosphere for a time disappears.

The cause of these hot winds is not well understood. Formerly it was supposed—not without some reason in support of the hypothesis—that they originated in the desert portion of the centre of the Australian continent. Other views, however, have been advanced, which tend to throw doubt upon this theory. Geographers are now inclined to consider the Australian hot winds as portions of an extensive system of heated air currents prevailing in many different parts of the world. In the south of Italy, for example, a pestilential wind blows from the coast of Africa, and, like our hot wind, though to a greater degree, obscures the air, debilitates the human frame, and blasts the vegetation or arrests its growth. But of all deleterious winds, none is so formidable as the hot desert wind of Arabia and Africa, known as the “simoom” or “semoom.” Terrible stories of its effects have been recorded by travellers, who point to the remains of whole caravans embedded in the desert sands as illustrations of its power. It may be doubted, however, whether, in the cases referred to, lack of water may not have contributed to, if not entirely caused, the loss of life which undoubtedly had occurred; for travellers in those regions being accustomed to the signs which portend the coming of the fiery blast, are enabled to take



the necessary precautions for their own safety; and even if some of them should succumb to its influence, a certain proportion would be likely to escape. A recent traveller in Arabia, Mr. Palgrave, has written a vivid description of the simoom; and as he narrates simply what he himself observed and experienced, his account may be regarded as free from the exaggerations which are believed to disfigure the representations of previous travellers. It will be seen that Mr. Palgrave himself throws doubts upon the accuracy of these descriptions. The following is his own statement:—

“ We resumed our way once more, and found the general appearance of the desert somewhat modified by larger patches of sand or grass on its black surface, and these continued to increase in number and size as we went on. Next day, the 23rd of the month, yet clearer signs of our approach to Wadi Sirhan became visible, and as we took a somewhat northerly direction, in order to join in with that valley, we sighted far off in the extreme distance a blue range of hills, running from west to east, and belonging to the Syro-Arabic waste, though unnoticed, to the best of my knowledge, in European maps. Meanwhile, the sand-patches continued to increase and deepen on all sides, and our Bedouins flattered themselves with reaching Wadi Sirhan before nightfall.

“ Here, however, an incident occurred which had well nigh put a premature end to the travels and the travellers together. My readers, no less than myself, must have heard or read many a story of the simoom, or deadly wind of the desert, but for me I had never yet met it in full force; and its modified form, or “shelook,” to use the Arab phrase, that is, the sirocco of the Syrian waste, though disagreeable enough, can hardly ever be termed dangerous. Hence, I had been almost inclined to set

down the tales told of the strange phenomena and fatal effects of this 'poisoned gale' in the same category with the moving pillars of sand, recorded in many works of higher historical pretensions than *Thalaba*. At those perambulatory columns and sand-smothered caravans, the Bedouins, whenever I interrogated them on the subject, laughed outright, and declared that beyond an occasional dust storm, similar to those which any one who has passed a summer in Scinde can hardly fail to have experienced, nothing of the romantic kind just alluded to occurred in Arabia. But when questioned about the simoom, they always treated it as a much more serious matter, and such in real earnest we now found it.

"It was about noon, the noon of a summer solstice in the unclouded Arabian sky over a scorched desert, when abrupt and burning gusts of wind began to blow by fits from the south, while the oppressiveness of the air increased every moment, till my companion and myself mutually asked each other what this could mean, and what was to be its result. We turned to inquire of Salim, but he had already wrapped up his face in his mantle, and, bowed down and crouching on the neck of his camel, replied not a word. His comrades, the two Sherarat Bedouins, had adopted a similar position, and were equally silent. At last, after repeated interrogations, Salim, instead of replying directly to our questioning, pointed to a small black tent, providentially at no great distance in front, and said, 'Try to reach *that*; if we can get there, we are saved.' He added, 'Take care that your camels do not stop and lie down;' and then, giving his own several vigorous blows, relapsed into muffled silence.

"We looked anxiously towards the tent; it was yet a hundred yards off, or more. Meanwhile, the gusts grew

hotter and more violent, and it was only by repeated efforts that we could urge our beasts forward. The horizon rapidly darkened to a deep violet hue, and seemed to draw in like a curtain on every side ; while at the same time a stifling blast, as though from some enormous oven opening right on our path, blew steadily under the gloom ; our camels too began, in spite of all we could do, to turn round and round and bend their knees, preparing to lie down. The simoom was fairly upon us.

“Of course we had followed our Arabs’ example by muffling our faces, and now with blows and kicks we forced the staggering animals onwards to the only asylum within reach. So dark was the atmosphere, and so burning the heat, that it seemed that hell had risen from the earth, or descended from above. But we were yet in time, and at the moment when the worst of the concentrated poison-blast was coming around, we were already prostrate one and all within the tent, with our heads well wrapped up, almost suffocated indeed, but safe ; while our camels lay without like dead, their long necks stretched out on the sand awaiting the passing of the gale.

“On our first arrival, the tent contained a solitary Bedouin woman, whose husband was away with his camels in the Wadi Sirhan. When she saw us rush thus suddenly into her dwelling without a word of leave or salutation, she very properly set up a scream. Salim hastened to reassure her, by calling out ‘friends,’ and without more words threw himself flat on the ground. All followed his example in silence.

“We remained thus for about ten minutes, during which a still heat like that of red-hot iron slowly passing over us was alone to be felt. Then the tent walls began again to flap in the returning gusts, and announced that

the worst of the simoom had gone by. We got up, half dead with exhaustion, and unmuffled our faces. My comrades appeared more like corpses than living men, and so, I suppose, did I. However, I could not forbear, in spite of warnings, to step out and look at the camels; they were still lying flat as though they had been shot. The air was yet darkish, but before long it brightened up to its usual dazzling clearness. During the whole time that the simoom lasted, the atmosphere was entirely free from sand or dust, so that I hardly know how to account for its singular obscurity."

---

## LESSON XLII.

### ALCOHOL.

Fer-men-ta-tion.	Del-e-te-ri-ous.	Phys-ic-al.
Mas-tic-a-ted.	Poi-son-ous.	In-vol-un-ta-ry.
Dis-til-la-tion.	Pun-gent.	In-de-pend-ent.
Tem-per-a-ture.	Nau-se-ous.	Stim-u-lant.

It may be as well, perhaps, to state, at the outset, that there are several kinds of alcohol, all, however, agreeing in their principal characteristics, and all producing similar effects upon the nervous system of animals. A description of one kind of alcohol may therefore be considered as applicable to the others in a general way.

The word alcohol is derived from the Arabic, in which language it denoted a fine essence, though it had various other meanings. It is also known as "spirit of wine," because originally obtained from wine, and "ardent" spirit, either from its burning taste, or because it readily burns when ignited. Alcohol may, however, be obtained from other liquids besides wine. It is contained in beer, cider, perry, and every other liquid which has undergone the process of fermentation. In Russia, a fermented

liquor is produced from potatoes ; and the Turcomans drink "koumiss," which is fermented mare's milk. We have, most of us, heard of the loathsome "kava" which, in most parts of Polynesia, is made by chewing a plant and allowing the mixture of saliva and masticated substance to ferment.

Alcohol is obtained from fermented liquors by distillation. When pure it resembles water in appearance, being perfectly clear and transparent. It is lighter, however, than water in the proportion of about four to five, and it boils at a much lower temperature. Unlike water, alcohol will burn, emitting a pale blue flame, which affords little light, but great heat. For this reason, it is much used by chemists when they desire to heat substances in glass vessels ; and it is the more valuable because the flame does not blacken the vessel to which it is applied. Many substances are soluble in alcohol which water will not affect, and in this point of view also it is of great service to mankind. Resins, gums, and balsams dissolve readily in alcohol ; and one of these gums, called benzoin, when so dissolved forms a healing balsam for wounds, and is known as "Friar's Balsam." Another of its properties, and one of great importance, is its power of preserving animal substances from putrefaction. Naturalists and surgeons find alcohol to be an article absolutely indispensable for their respective pursuits. In fact, the uses of alcohol are so numerous and so varied that, if the art of making it were lost, the whole civilised world would suffer.

On the other hand, it is undoubtedly a poison when swallowed in quantity. Many accounts have been published of deaths of young children, caused by their having been drugged with some alcoholic liquor. Some medical men, in fact, affirm that alcohol, in any form and in



any quantity, is poisonous when taken into the human stomach. This opinion is not, however, generally held, many physicians regarding alcohol as a medicine which, when skilfully administered, produces salutary effects in certain diseases. Upon one point all are agreed, however—when taken in excess, especially if the practice be continued for any length of time, alcohol exercises a most deleterious influence upon both body and mind. Notwithstanding that this fact is patent to the commonest observation, the use of alcohol, in some form, as a beverage, is persisted in by the majority of even civilised nations.

Fortunately, alcohol is of so pungent a nature that it cannot be swallowed unless greatly diluted. Water, with which it readily mixes, is generally used for this purpose; and in the form in which alcohol is usually sold, water constitutes a large proportion of the mixture. In wines, the proportion varies from about eight per cent. in light German wines to twenty-seven per cent. in the richest Australian wines. The proportion is much larger in what are commonly termed “spirits.” These spirits are brandy, whisky, gin, and rum. The first is distilled from wine, and even from the refuse left in the vats after the fermented grape juice is drawn off into casks. Whisky is manufactured principally from barley, but other cereals may be used for the purpose. This is also the case with gin, which derives its peculiar flavour from the juniper berries used in distilling this spirit. Rum is obtained from sugar, and from the treacle and refuse produced in making sugar from the cane. Other alcoholic spirits are used in various parts of the world, and are obtainable from any substance that contains either starch or sugar. Potatoes, when distilled, give a peculiar alcohol, which is nauseous in taste, and specially injurious to the human frame; but being produced at a



cheap rate, it is much used in adulterating other spirits. Beetroot, carrots, dates, bananas, cherries, and peaches, have all been employed in the production of ardent spirits.

Beer, in the form of ale and porter, cider, and perry, contain alcohol, but generally in small proportions, and are used as beverages by great numbers of people.

It may now be asked, What is the good of drinking liquids that contain alcohol in large or small quantities? The answer to this question will depend upon what we ascertain to be the effects of alcohol upon the physical frame. Taking note in passing that alcohol is in no sense *food*; we know as fact that, when mixed with water and swallowed, it is immediately absorbed by the walls of the stomach, and hence is directly carried into and mixed with the blood. It rapidly reaches the heart, and is transmitted with the circulation not only to the brain and other vital organs, but also to the remotest extremities of the body. Muscles, nerves, the delicate tissues of the lungs, the capillaries—the smallest blood-vessels of the body—all become charged with the alcohol. The first consequence of swallowing alcohol is manifested in the increased action of the heart. The circulation is unnaturally quickened, and the blood is driven with greater force and speed throughout the system, and a pleasant feeling of warmth is experienced for a time. During this stage, the nerves controlling the involuntary muscles—those, namely, which are independent of the will—lose their power, and the heart in consequence beats more strongly and more frequently than is natural. If no more alcohol be taken, reaction gradually sets in; and the blood, which had been forced to the surface and extremities of the body and there chilled, returns to the heart colder than the usual temperature. The result is that the heart beats more feebly, and the proper tempera-

ture of the body being lowered, the individual feels not only cold but weak.

Other organs also are affected—the breathing is quickened, the muscles are stimulated, and the brain partakes of the general excitement. After swallowing an alcoholic beverage, a man will generally find his spirits rise; he is pleasanter, wittier, and more active mentally than before. This condition is, however, but transient. When the first effect is over, he becomes low-spirited, dull, and jaded; his mind is fatigued with the unnatural effort, just as the body would be if, under the influence of the same stimulant, he had undergone some excessive physical exertion. Some time elapses before body and mind thoroughly regain their usual tone. The alcohol incorporated into the system is expelled by slow degrees only. Some portion is removed through the lungs by respiration, another by the pores of the skin, and a third through the kidneys. The carbon, of which alcohol is partly composed, mixing with the blood, imparts to it a darker colour than the natural hue, and produces other effects upon it that are injurious to health.

Supposing, however, that while the effects of the first dose of alcohol are still felt an additional quantity be taken, the consequence would be an aggravation of the symptoms already existing. The circulation would be still more quickened, the respiration would become more rapid, and the nervous system would be stimulated so as to be still less under control. A flushed face, an oppressed brain, blunted perceptions, and clouded senses, together with relaxed muscles, would soon be evident; and, finally, by continuing to imbibe, complete intoxication ensues. We are unfortunately but too well acquainted with this most disgusting condition to which human beings can be reduced, and with the terrible consequences to individuals

as regards health, as well as their moral and pecuniary interests. A single false step of this kind may be retraced, though it is always difficult to remove the consequences of even one intemperate act. It is one of the most baneful effects of drinking alcohol that a constant desire for it is set up in the system, and that when once the habit of drinking has been established, the craving becomes too strong to be resisted by ordinary minds. The habitual drinker becomes a slave to his pernicious vice, and callous to the opinions of his friends and the rebukes of his well-wishers. Along with the enfeebling of his will he also appears to lose the moral sense, so that no meanness or wrong seems to be too great for him to perpetrate, provided it will secure him a supply of the coveted liquor.

Such being the consequences and the dangers of drinking alcoholic liquors, it may be deemed wonderful that so many people continue to indulge in the habit. One explanation of the maintenance of the custom is perhaps that it is so intimately bound up with the practices of our social life; and, apart from any enjoyment to be derived from the liquor itself, there are the pleasures of cheerful company and friendly intercourse. It is not to be expected that the use of such beverages will be discontinued altogether, but it cannot be too earnestly impressed upon old and young that moderation in regard to this indulgence is not only a duty, but a necessity for the preservation of their health, and of their various faculties in full vigour. In proportion as they indulge in the seductions of strong drink they incapacitate themselves from the enjoyment of higher, purer, and more lasting pleasures; and even the most common of the pleasures of life pall upon their taste, and lose, as it were, their flavour.

## LESSON XLIII.

WINTER. (FROM "THE TASK.")

WINTER.

O WINTER, ruler of the inverted year,  
Thy scattered hair with sleet-like ashes filled,  
Thy breath congealed upon thy lips, thy cheeks  
Fringed with a beard made white with other snows  
Than those of age, thy forehead wrapped in clouds,  
A leafless branch thy sceptre, and thy throne  
A sliding car, indebted to no wheels,  
But urged by storms along its slippery way,  
I love thee, all unlovely as thou seem'st,  
And dreaded as thou art! Thou hold'st the sun  
A prisoner in the yet undawning east,  
Shortening his journey between morn and noon,  
And hurrying him, impatient of his stay,  
Down to the rosy west: but kindly still  
Compensating his loss with added hours  
Of social converse and instructive ease.

WINTER EVENING.

Come, Evening, once again, season of peace;  
Return, sweet Evening, and continue long.  
Methinks I see thee in the streaky west,  
With matron step slow moving, while the Night  
Treads on thy sweeping train; one hand employed  
In letting fall the curtain of repose  
On bird and beast, the other charged for man  
With sweet oblivion of the cares of day:  
Not sumptuously adorned, not needing aid,  
Like homely-featured Night, of clustering gems;  
A star or two, just twinkling on thy brow,  
Suffices thee; save that the moon is thine  
No less than hers, not worn indeed on high  
With ostentatious pageantry, but set  
With modest grandeur in thy purple zone,

Resplendent less, but of an ampler round.  
Come then, and thou shalt find thy votary calm  
Or make me so. Composure is thy gift.

## WINTER NOON.

The night was winter in its roughest mood ;  
The morning sharp and clear. But now at noon  
Upon the southern side of the slant hills,  
And where the woods fence off the northern blast,  
The season smiles, resigning all its rage,  
And has the warmth of May. The vault is blue  
Without a cloud, and white without a speck  
The dazzling splendour of the scene below.  
Again the harmony comes o'er the vale ;  
And through the trees I view the embattled tower  
Whence all the music. I again perceive  
The soothing influence of the wafted strains,  
And settle in soft musings as I tread  
The walk, still verdant under oaks and elms,  
Whose outspread branches overarch the glade.  
The roof, though moveable through all its length,  
As the wind sways it, has yet well sufficed,  
And, intercepting in their silent fall  
The frequent flakes, has kept a path for me.  
No noise is here, or none that hinders thought.  
The redbreast warbles still, but is content  
With slender notes, and more than half suppressed ;  
Pleased with his solitude, and flitting light  
From spray to spray, where'er he rests he shakes  
From many a twig the pendent drops of ice,  
That tinkle in the withered leaves below.  
Stillness, accompanied with sounds so soft,  
Charms more than silence. Meditation here  
May think down hours to moments. Here the heart  
May give a useful lesson to the head,  
And Learning wiser grow without his books.  
Knowledge and wisdom, far from being one,  
Have oft-times no connection. Knowledge dwells



In heads replete with thoughts of other men ;  
 Wisdom in minds attentive to their own  
 Knowledge, a rude unprofitable mass,  
 The mere materials with which Wisdom builds,  
 Till smoothed and squared, and fitted to its place,  
 Does but encumber whom it seems to enrich.  
 Knowledge is proud that he has learned so much ;  
 Wisdom is humble that he knows no more.

---

### LESSON XLIV.

#### SALT MINES.

Im-preg-na-ted.  
 Dis-ap-pears.  
 Suc-cess-ful-ly.  
 Sal-ine.

Abs-tract-ed.  
 Sub-sid-ence.  
 Com-par-at-ive-ly.  
 De-pos-its.

Se-cure-ly.  
 Ven-til-a-tion.  
 Gauze.  
 Dis-sem-in-a-ted.

UP to the present time, no large deposits of salt have been discovered in Australia. It is true that after long continued dry weather, the water of certain streams is found to be more or less impregnated with salt, which is believed to be derived from the earth. Such is the case, for instance, with the Darling River, the water of which, in particular spots, and in time of drought is, from this cause, undrinkable by man or beast. This condition, however, rapidly disappears when rain has fallen, and the volume of the river has increased to its usual limits. In many parts of the country, moreover, when wells are dug, the water obtained from them is salt or brackish, and hence it is inferred that the soil contains a certain proportion of salt. Still, this valuable mineral has never yet been met with in Australia in such quantity as would repay the cost of bringing it to market. One consequence of the absence of salt is the necessity for importing from other countries a sufficient quantity to



supply not only what is required for household purposes, but also all that is given to sheep and cattle. It is well known that, without salt, sheep and oxen, and even horses, are liable to disease when fed upon the natural pasture of districts which contain no supply in the soil. The salt used as a condiment and for preserving meat, as well as the rock salt given to cattle and sheep, reaches Australia from Liverpool, from which place many thousands of tons are annually imported. Some years ago one kind of salt was obtained in the vicinity of Sydney by the evaporation of sea water. This industry, which appears not to have been carried on for many years past, might still be successfully practised upon all the coasts if the produce could be disposed of at a profit.

Liverpool salt, as it is called, is obtained from the saline deposits which underlie a large portion of the county of Chester. It is found in two forms, liquid and solid. The brine springs contain water in which salt has been dissolved by a natural process in the earth. When, by boiling for a sufficient period, the water has been evaporated, the salt is left behind, and assumes the crystallised form in which it is usually seen. So great is the quantity of salt abstracted from the earth by pumping up the brine that the surface in some places frequently sinks many feet below the level of the surrounding country, and thus causes not only loss, but often great danger. This subsidence is occasioned not so much by the excavation of rock salt as by the eating away of the solid portions of the bed by the water which sinks into it from the earth. It is in this way that the brine springs are supplied; and when they are emptied by the pumps the superincumbent earth is left without support, and has consequently a tendency to sink. Some conception of the extent of the subsidence of the land surface

may be formed when it is remembered that, for a long series of years, the quantity of salt obtained annually from the Cheshire beds may be reckoned by hundreds of thousands of tons. Similar subsidences occasionally happen in New South Wales, in the neighbourhood of coal mines, but to a comparatively small extent, the upper crust of rock and earth being rarely left without support, and being, moreover, of a more solid and tenacious character.

In other countries, salt is obtained in the solid form from mines which resemble, in their general character, those from which coal and metals are procured. A shaft having been sunk to the depth necessary to reach the bed of rock salt, the mineral is excavated from tunnels, and conveyed to the surface. As in coal mines, pillars of the material are left to support the crust of rock above, and they are of sufficient size to effect this purpose securely. Little or no water is found in these mines, and there is consequently no danger that the supports will be eaten away and dissolved. The tunnels extend for long distances; but as the beds of salt are far thicker than coal seams, the height of the subterranean ways is greater than in coal mines. In the latter, the seams are often of so little thickness that the miner is compelled to sit, and even to lie down when at work, while in salt mines the passages resemble streets in their dimensions, and yet room is left for sinking still deeper without exhausting the thickness of the beds. Another important point of contrast is the ventilation of the two kinds of mines. Even the best of coal mines require to be supplied with fresh air by artificial means, as, from the shallowness of the strata of coal, circulation cannot otherwise be maintained. In addition to this difficulty, the exhalations from the coal must be taken into account.

Two highly deleterious gases are disengaged from coal, and these have to be expelled, and their places supplied by atmospheric air forced into the mine by great pressure. In a salt mine, on the other hand, the height and width of the passages allow of a much freer circulation of air, while no emanations from the salt poison the atmosphere, and endanger the safety of the mines.

At times, by removing the salt in blocks, large rooms are excavated, some of them resembling churches, with pillars supporting arched roofs, as may be seen in cathedrals above ground. In fact, such rooms are often used for church purposes; and it is said that when they are lit up with the miners' torches, the effect is extremely grand. The crystals of salt sparkle in the light which is reflected from a thousand points, producing a gorgeous spectacle. In this respect salt mines contrast strongly with coal mines, for in the latter, men have to work in deep gloom, their candles, to guard against danger of explosion, being enclosed in a safety lamp, which allows the light to escape only through wire gauze. In salt mines, on the other hand, naked lights of any size may freely be used, and the miners perform their labours under cheerful and even attractive circumstances. The difference as regards healthiness is strongly marked. In some of the larger coal mines, in which horses are employed to draw the coal to the bottom of the shaft, these animals are never removed to the upper air until they die; but human beings would be unable, without risk to their health, to endure confinement in such an atmosphere as exists in even the best ventilated mines. They accordingly work below ground for a limited number of hours, and then return to the surface. In a salt mine, the workmen, as well as the horses, live in the mine without injury to their health; they make their homes

in houses hollowed out of the salt; and thus form subterranean villages. It is not uncommon for children to be born in such mines, and to see the daylight only on the rare occasions when their parents have need to visit the outer world.

Other countries besides Australia are destitute of salt, which requires to be imported from Europe. Certain parts of Africa, for instance, have no salt but such as is obtained from other countries. It is, consequently, a somewhat costly luxury; and small pieces are given to the children of the wealthier negroes, in the same way as we give barley-sugar and other sweetmeats to our own little folks. It is curious to note how, in this way, the products of distant lands are disseminated, and how a mineral from the brine springs of Cheshire, or the mines of Poland, may be prized as a sweetmeat in the forests of tropical Africa.

---

## LESSON XLV.

### LABOUR.

In-ven-tion.  
Cre-a-tion.  
In-tel-lig-ence.  
Li-quor.

Ser-vi-ces.  
Sub-ju-ga-ted.  
Gov-ern-ment.  
Eas-i-ly.

Eu-ro-pe-an.  
Cen-tu-ries.  
Chem-ic-al.  
Me-chan-ic-al.

LABOUR and the forces of nature are the sources of wealth; and since Nature only gives her powers where labour is bestowed to secure them, it is clearly one of her laws that by labour only shall men live. They that do not work must not expect to eat.

It is labour that creates the wealth of the world, but not mere hand labour. Your manual labourer often speaks as if his class alone produced the riches, which, it is too true, his class seldom enjoys. He speaks of

those who work only with pens or drawing tools, who think and invent, as the drones of society, that live and prey upon its hard-working hand labourers. Those who speak so forget that the high pay of the man who labours with his mind is got only because his services are more valuable to the world than those of the hand worker—they are more in demand, and more difficult to be got. And no wonder that the world so judges of them. For see, by invention and thought, one can now grind as much corn as a hundred and fifty could, in those ancient times when hand workers sat and ground it between two stones. By the invention and thought of the barber Arkwright, one man can now do more in cotton-spinning than many hundreds could do before he thought out and invented his machines. It is true that hand workers spend their strength in the creation of wealth, and have a right to their share; but what that share ought to be, because of their strength, may be judged of by him who remembers that the steam-engines now at work in Great Britain exert more strength than one-third of all the strength of all mankind. Shall not men rate the services of those whose thoughts and inventions put such force at their disposal higher than those of mere hand workers? It is the intelligence which a man can put into his labours that alone can render his services valuable in these days of iron and steam; and even that must be of a high kind if he wishes to be highly paid. For if a man works at a trade which requires no great amount of intelligence or skill, he will find that iron and steam can do that as well as he can, and better even, as well as cheaper. Machines can count numbers; machines can tell the quantity of liquor drawn from a cask; machines can measure cloth or ribbons; machines can tell how many people enter an omnibus or an exhibition; such



kinds of labour can never be highly paid, for the services they render can be got wherever iron and water can be had.

Nor do those who work with their brain rather than their hands get their high wages by any kind of unjust law or government authority. It must be remembered that the price given for anything is only what the purchasers are willing to give for it, to save themselves trouble, not what the seller demands. The opinion of the purchaser is the real test of value, and since no man is forced to buy in a free country, there is no injustice done where those whose services are easily got or easily done for one's self receive small pay, and those whose services are much wanted and hard to obtain are highly paid. The great lesson that all of us may learn from this is, to devote our time to study and to qualify ourselves as far as we can to render services to the world of a kind which neither ignorance nor machinery can do. In Australia, workmen are not slaves like those of ancient Rome and Greece and Egypt; nor serfs like those of European countries some centuries ago; but free to choose their own occupation, and free to reap the highest rewards which they can induce society to give them for the work they do themselves, or for the services they can render to it, when they constrain the chemical, mechanical, and electric powers of nature to aid them in their work.

Wages depend upon the *supply* and *demand* in regard to labour. Now those who supply labour are, in fact, the population, since almost the whole of a people must work in one way or other. If a country have too large a population, their wages must be low as a whole, however they may differ in different trades, for the people will strive against each other to obtain employment and the means of living.



## LESSON XLVI.

## IN THE DARK CONTINENT.

Fab-u-lous.	Re-search-es.	Con-tra-ven-tion.
An-thro-po-pha-gi.	Plat-eau.	Re-sist-ance.
Trav-ersed.	Un-stead-i-ness.	Sus-pi-cion.
Met-a-phor-ic-al.	So-ci-a-bil-i-ty.	Per-ceived.

It is not many years since the interior of Africa was utterly unknown. Vague and contradictory reports of its physical conformation, natural products, and inhabitants, reached Europe from time to time; but the only certain knowledge gained was the fact that ivory and slaves were produced in abundance, and exported from the towns of the coast. A few centuries ago, it was the custom to locate in Africa all the fabulous and monstrous specimens of the human race that were then imagined to exist. Shakespeare alludes to the "Anthropophagi, and men whose heads do grow beneath their shoulders," in a speech which he puts into the mouth of an African Moor; and, even in more recent times, the centre of this continent has been regarded as the country of dwarfs and men with tails. The difficulties of penetrating into the continent were so greatly exaggerated, that few attempts were made to enter it; and Australia, strangely enough, was crossed before Africa had been traversed from sea to sea.

The term, "Dark Continent," as applied to Africa may have reference to the dark colour of its inhabitants, or it may be intended as a metaphorical allusion to our ignorance respecting it. Each of these views is appropriate enough, though the latter reason is rapidly ceasing to be valid, on account of the numerous expeditions which have been sent to explore it in various parts. In the following remarks, we shall speak of those portions of the

continent which were unknown until recent years. The northern part of Africa includes Egypt and other countries, which have been known from the remotest ages; and the southern portion, embracing Cape Colony, Natal, and the Transvaal, is well known in every respect. The remainder would comprehend all the recently discovered territory which, for the most part, lies upon, and immediately to the south of the equator. It is only necessary to mention the names of Livingstone, Burton, Speke,

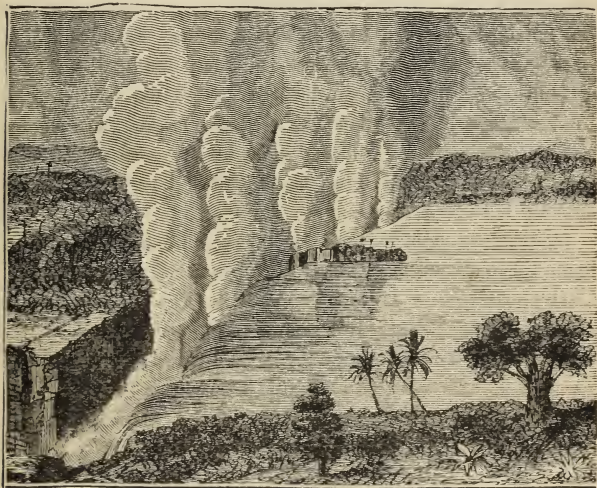


TABLE MOUNTAIN AND TABLE BAY.

and Grant, Baker, Cameron, and Stanley, to recall to mind the startling discoveries they made, and the toil and privations they endured while prosecuting their researches. Livingstone, it will be remembered, fell a martyr to his zeal on behalf of African exploration, and of his desire to benefit the African peoples.

From these explorers, and others sent by continental nations, we have learned much of the physical structure

of what may be termed Equatorial Africa, including under that term the country south of the equator as far as the river Zambesi. On the shores of both oceans there is a narrow strip of coast little elevated above the sea level. Behind these coast districts rises a plateau of considerable height, which varies in different parts, but probably averages 2000 feet. On the plateau are ranges of lofty mountains, some of the summits rising above the snow line. These mountains, under the title of Mountains of



VICTORIA FALLS ON THE ZAMBESI.

the Moon, were probably known to the ancients, who however, were mistaken as to their exact position, supposing them to run across the continent from east to west. An Australian versed in the geography of his native land will not fail to perceive certain obvious points of resemblance between the conformation of Africa and Australia. Numerous lakes are found on the table-land,

and a few are of great extent. Some of the principal of these are the Victoria and Albert Nyanzas, Tanganyika, and Nyassa. From the mountains spring a large number of streams, which ultimately form three drainage systems—that of the Nile to the north, the Congo to the west, and the Zambesi to the east.

The vegetable productions of this part of Africa, while partaking of the usual character of the plants of tropical regions, present some features of special interest. In particular, the baobab tree may be mentioned as one of the characteristic plants of the region. Animal life is peculiar and abundant. Antelopes and pachydermatous animals, such as the rhinoceros, elephant, and hippopotamus, are spread over the whole district. The rivers are infested with crocodiles; and locusts and white ants are highly destructive to vegetation. The tsetse fly is equally injurious to domestic animals.

The native man belongs to the negro family, mixed in some districts with Arabs and Abyssinians. They vary as to the degree of civilization attained in different tribes, though all have the same general characteristics—abject superstition, unreasoning subjection to their rulers, thirst for blood, and unsteadiness of purpose, combined with slender mental powers. They nevertheless possess some excellent qualities, such as industry and sociability; and, but for their execrable government, and the debasing effects of the slave trade, they might develop even higher traits of character. Their kings appear to be absolute masters of the lives and property of their subjects, and are held in such reverence that a slight and unintentional deviation from prescribed ceremonial usage is punishable with death. Speke mentions an instance in which a king ordered one of his wives to be put to death for presuming to offer him a gift, in contravention of court etiquette.



Slave-hunting is carried on principally by Arabs, with the assistance of their negro slaves. All African explorers speak of this detestable pursuit with horror and indignation. Usually the plan adopted is the following. The chief hunter and his men, who are supplied with fire-arms, fix upon some negro village, from which slaves are to be stolen. After living in peace and apparent friendship, until the suspicions of the inhabitants are lulled to rest, and the usual precautions against attack are relaxed or discontinued, a sudden onslaught is made upon the village, which is surrounded on all sides. The attack is made generally at early morning, or some other time when the negroes are at rest; the warriors rushing to the defence of their property and families are shot; and when all resistance is overcome, the young men, women, and children are captured and enslaved for life. Old men and young children are ruthlessly destroyed as unfit for slavery, and therefore unprofitable; and the little community ceases to exist. The sufferings of the slaves then commence. Chained together, fettered, burdened with heavy loads, they are compelled to march at the orders of their captors. Worn-out with fatigue and starvation, numbers fall dead by the way; others are liberated by their new masters, and left to perish; and generally not one-half survive the journey. Those that reach their destination are little better than skeletons, and some never recover from the effects of the toilsome march and its attendant miseries. Hitherto all attempts to put down this iniquitous traffic have failed, and its horrors continue to be a blot upon the boasted civilization of the nineteenth century. It is a singular characteristic of the African races that slaves are the most merciless and ferocious of slave hunters and slave drivers.

Reports had reached Europe many years ago that some

of the negro tribes were addicted to cannibalism, but these statements were received with suspicion as "travellers' tales." Any doubt on this point that remained in the minds of inquirers was dispelled by the experience of Stanley in his march across the continent, from Zanzibar to the west coast, along the course of the Congo. The banks of that river were found to be inhabited by various savage tribes, who looked upon the traveller and his followers not merely as foreign enemies and invaders, but, what is infinitely more horrible, as *meat*. As soon as the array of strangers was perceived travelling on the bank, or sailing down the stream, the tribe dwelling in the vicinity at once prepared for the attack. The great war drum was sounded, the warriors armed themselves, and rushed to the place of assembly, and the whole tribe gathered to view the persons who, it was hoped, would soon be converted into food. The intended victims must often have quailed at hearing the eager cries of the savages who literally thirsted for their blood, and whose threats of extermination were accompanied with gestures that left no doubt as to the horrid fate in store for them if conquered. They knew that to escape being devoured, they must beat off their cannibal assailants; and that to achieve this object, they must fight with desperate courage, as well as with warlike skill. Day after day for months, Stanley was compelled either to elude or to combat these ferocious enemies, until at length he reached a part of the country where so much of civilization existed as to banish cannibal practices.

Among such a people, it could hardly be expected that religious or moral obligations would be understood. In fact, in Equatorial Africa, as in many other parts, the belief in witchcraft or sorcery seem to take the place of religion. Some of the tribes regard sickness as the result



of witchcraft, to which cause they also ascribe the failure of any undertaking, public or private, in which they may have engaged. In some cases to be suspected is to be condemned, and the wretched sorcerer or sorceress suffers the severest tortures without any opportunity for self-defence. An ordeal for the trial of the accused is provided in other cases; but even in these, acquittal does not always accompany innocence, as much depends upon the goodwill of the professional witch-finder who is officially charged with the inquiry.

Under a better system of government, not only might the commercial products of the country be enormously increased, but the people might be raised in the scale of humanity. Until the slave trade is entirely abolished, however, by extinguishing the demand for slaves from without, there is little hope of any permanent improvement in the condition of the people of this part of Africa. When this is once effected, and the rudiments of European civilization are introduced, other benefits will follow; the rulers will learn how to raise a revenue without robbing and murdering their subjects, who, in their turn, being relieved from the apprehension of being plundered, will endeavour to produce such articles as will enable them to obtain in exchange the coveted European manufactures. Cotton, coffee, sugar, grain, and many other productions of tropical and sub-tropical climates may be grown to advantage. There are indications of mineral wealth which simply needs development; and ivory is still an important article of commerce, though rapidly declining in amount from the gradual extermination of the elephant. In return for all these exports, a market would be established for goods imported from Europe, and thus the people of both continents would secure great and lasting benefits from the reciprocal exchange of commodities.

## LESSON XLVII.

## THE NORMANS.

Por-tion.	En-ter-prise.	Ef-fem-in-a-cy.
Wrest-ed.	Stim-u-la-ted.	Su-per-sti-tious.
Van-quished.	Dis-cerned.	Re-stric-tion.
Med-i-ter-ra-ne-an	Al-le-gi-ance.	Hein-ous.

THE battle of Hastings, fought in 1066, was gained by William, Duke of Normandy. His army was composed principally of his own subjects, the Normans, but included, in addition, soldiers from Flanders, and from Burgundy, Brittany, and other provinces, now forming portions of France.

Normandy itself had formerly been a French province, and received its name in exchange for that of Neustria from the Norsemen, or Northmen, by whom it had been wrested from the feeble monarch who, at that time, occupied the throne of France. Little more than a hundred and fifty years had elapsed since an army of Norsemen, under a leader named Rolf, or Rollo, had conquered this province, and established themselves therein as the governing class, adopting at the same time the language, manners, and religion of the vanquished. Their original home was Norway and the adjacent countries. They were, consequently, of the same Scandinavian race as the Danes, who had conquered and settled in various portions of the British Islands, but especially the eastern seaboard of England.

For centuries past the Danes or Northmen had ravaged the countries bordering upon the North Sea and the Atlantic, and had even entered the Mediterranean, plundering the rich lands and cities of what were at that period the most civilised portions of Europe. The piratical expeditions of the Northmen were encouraged

by their religion, as well as by their national customs. A man's property among them descended to his family, each of whom possessed an equal right to it; and as it was rarely sufficient for all, the boldest and most adventurous would accept compensation for their share, and seek for better fortune in some warlike enterprise. Sailing forth in their long ships, in the management of which they were specially skilful, they would visit some country from which rich booty could be acquired by force of arms. Their hardy, vigorous nature disposed them to think lightly of danger or difficulty, while their religion, cruel and blood-stained as it was, stimulated their natural bravery into the most reckless and furious courage. Scorning to yield themselves, they showed no pity towards their opponents, and slaughtered without mercy. They believed that their happiness in the future world depended upon the number of persons they had slain, and upon the manner of their own death upon the field of battle. Retiring with their plunder to their homes in the north, they would spend a time in feasting and enjoyment until, having exhausted their wealth, they would set out upon another expedition to replenish their stores. Gradually, however, they discerned that taking possession of a country was better than robbing it; and they were accordingly found conquering and settling in various parts of England, Ireland, and Scotland.

Rolf had been one of the most successful leaders of these piratical expeditions; but, having been outlawed from his own country, Norway, he gathered a band of followers, sailed southward, and after various adventures, reached France. He landed and encamped near Rouen. This town was yielded to him, and thenceforward became the seat of his government. Finally, Rolf demanded from the French king the province of Neustria, which

he had subjugated, and which he ruled thenceforward under the title of Duke. In consideration of this grant, Rolf swore allegiance to the king, Charles the Simple, and agreed, as his vassal, to help him in time of war. This arrangement, by which warlike leaders held lands and dignities from a superior on condition of giving military service when required, was called the "feudal system;" and Rolf having been baptized, offered grants of land upon the same terms to such of his warriors as became Christians. In this way, the country came into possession of the Norsemen as the ruling class, and it gradually became known as Normandy, and the people as Normans. Without losing their courage and energy, the Norsemen quickly adapted themselves to their new religion, and to the habits and manners of the people over whom they ruled. In course of time, they adopted the language of the country, retaining, however, some peculiarities in which it differed from the dialects spoken in other parts of France, and which led to its being styled Norman-French. Under these influences, the savage heathen pirates were softened and polished; and in a generation or two, the Norman knight or noble became noted as an example of courage without ferocity, of gentle manners without effeminacy, of a high sense of honour and of respect for religion without superstitious fear. The original qualities of the race—energy, astuteness, and deep religious feeling—were, however, sometimes turned to bad account in individuals, whose lives appear to have been compounded of violence, treachery, and hypocrisy. Still, the Normans were generally distinguished by the better characteristics of their race.

Such were the people whom William the Conqueror introduced into England, and who were destined to influence the national character, as well as its history, in

no trifling degree. Having granted lordships and lands to his followers in return for military service, William established the feudal system in England, and by this act effected a great revolution in the laws which related to the possession of landed estates. William was stern and unrelenting as a ruler; and when, in after years, troubles arose in his government, the darker qualities of his Norse blood were abundantly manifested. Hence his really great traits of character are sometimes overlooked by those who dwell upon his implacable vengeance towards rebels and traitors, rather than upon his piety, the purity of his life, or his strong desire to rule with justice according to English laws. The greatest exception to the general equity of his acts was the institution of Forest Laws, similar to those which he had maintained in Normandy, and which had led to serious quarrels with his subjects in that province. By these laws all the wild animals in the English forests were considered the king's property, and the killing of any kind of game was regarded as an offence well nigh as heinous as murder. When, in addition to these hitherto unknown restrictions, William created the New Forest by depopulating a large tract of country in Hampshire, the English, and many even of the Normans, held him in great detestation, and the chroniclers of the time speak of him in language of the bitterest hatred.

The Norman conquest, though the cause of much misery at the time, eventually proved to be a decided advantage to England. It led to a complete regeneration of the people. The West Saxons, the Angles, and the Danes, though dissenting among themselves, joined in a common hatred of the Norman conquerors, but as time rolled on, they were all fused into one people who were distinctively English. A new national character,



combining the best qualities of all the others, was thus evolved; and whether in peace or in war, in learning or in the arts of life, England began to fill a foremost position among European nations. The language was enriched by many words borrowed from the Norman-French, which, as the language of the king and nobles, as well as of the courts of law, was in general use throughout the country, with the exception of the rural districts. Although the English language retained its Anglo-Saxon character and structure, notwithstanding its acquisitions from the Norman-French, there yet remain some singular relics of the use of the latter, especially in law terms, and in the words in which the monarch signifies assent to Acts of Parliament, or the contrary. Another influence exerted by the conquest was that produced by the legal system of the Normans. Their laws were a mixture of the old Roman law in force in the province prior to its conquest by Rolf, and of the feudal system. These elements were gradually incorporated with the Anglo-Saxon laws, dear to the English as the laws of the venerated Edward the Confessor, and from the resulting combination has sprung the present legal system of England.

---

### LESSON XLVIII.

#### THE DIGNITY OF LABOUR.

In-dus-try.

De-lu-sion.

Yields.

De-mean.

Sub-sist-ence.

In-de-pend-ence.

Ben-e-fact-ors.

Mis-con-cep-tion.

Er-ro-ne-ous.

Ad-vance-ment.

Mis-chiev-ous-ly.

Scep-ti-cism.

It is a common subject of remark that the young people of the Australian colonies do not, as a rule, follow the example of their parents as regards the occupations by which they purpose to earn a living, or, if that be un-



necessary, to dispose of their time. Take, for example, the family of a tradesman who, by honest industry, has accumulated a little property, and has also striven to give his children a better education than he had himself received. His boys, perhaps, have acquired an amount of book learning rarely met with in their rank of life thirty years ago, but which, thanks to the schools everywhere to be found in Australia, is common enough in these days. These boys look upon their father's business as too "low" for them, believing themselves intended and fitted for higher things; and in this delusion, they wear out their lives in seeking to obtain a paltry clerkship which, when secured, yields but a bare subsistence for the present, while it shuts out the prospects of improvement in the future. A similar mistake is made by the girls. Having picked up some knowledge of piano-forte playing with occasionally a smattering of French, they consider themselves young ladies, who could not demean themselves by doing any useful kind of work, and, consequently, lead idle lives, of no benefit to themselves or others. In both cases, the course taken is followed by much unhappiness. The boys grow up to be clerks, or persons in salaried employment, without a career, without manly aspirations or enterprising spirit, and spend their lives in vainly hoping to be regarded as gentlemen, while they possess none of the means by which such a position requires to be supported. The girls become not ladies, but "fine ladies," useless as housewives, and ignorant or careless of all the means by which homes may be rendered attractive and happy. Had the boys followed some mechanical trade, they would have enjoyed more real independence, a more liberal remuneration, and a more healthful employment; and, further, they would have found wider scope for their abilities in undertakings

likely to secure them honour and wealth in after times. The girls, too, by qualifying themselves by training and industry, might acquire honour and regard as benefactors to others, while, at the same time, they added to their own sources of happiness.

That so large a number of healthy and otherwise sensible young people should fall into so grievous an error must arise from some lack of knowledge on their part, or from some misconception of the great objects of life, or false view of their relations to society in general. It may seem incredible that young people should deem themselves entitled to begin life at the point which their parents had attained, only after years of toil and battling with circumstances; and it may repay our trouble if we endeavour to ascertain how such a mistake has originated, and how such erroneous views may be corrected.

It may be admitted at the outset, as a right, if not as a duty, that every one is at liberty to improve his worldly position by seeking to increase his wealth, and to elevate his social condition. It may further be conceded that these motives are among the mainsprings of social and national progress, and that they cannot be dispensed with in our present state of civilization. Where, as in some despotic countries, these motives are weakened, or where, as among barbarous nations, they do not exist, little advancement will be made, and the great body of the people will be poor. On the other hand, where motives of this kind are allowed free scope for exercise, wealth is accumulated rapidly, national progress is marked, and the people generally are raised above actual poverty. It is not, therefore, in the motive that we must seek for the desired explanation. The question is not as to the propriety of seeking advancement in life, but as to the mode in which young people strive to accomplish that

object. The disposition to avoid manual labour of any kind, the idea that it is degrading, and the belief that greater respectability attaches to clerical employment are the errors which too frequently mislead the young, and mischievously influence their choice of occupations. If a youth feels that, by natural talent and education, he is better adapted for mental than for physical labour, it is right for him to enter upon a career in which such qualifications are necessary, provided he can thereby secure the means of living comfortably and independently. On the other hand, if not qualified to engage in a profession, the great probability is that he would gain a more honourable and independent livelihood, with higher and less fluctuating remuneration, as a skilled artizan, in an employment which, while requiring some amount of physical exertion, makes at the same time an equal demand upon the mental faculties. That such employment is not degrading, and that it is as respectable as any other in the eyes of those who are capable of judging, may easily be shown. If we refer to ancient times, we shall find that some of the grandest and most honoured of the old Romans in Rome's best days cultivated their own farms. They left the plough to take command of armies, and having performed their duty in that position returned, without loss of consideration in the minds of their fellow-citizens, to their rural occupation. Among the ancient Germans, the smith was held in the highest honour, and his craft was deemed noble. Every Jew was instructed in some handicraft, and was thus enabled to earn his own living. Coming to more recent times, it would be possible to name hundreds of successful men who began life in the humblest positions, and by sheer hard work, supported by honesty, and guided by intelligence, attained to opulence and honour.

Examples may be found in every Australian colony, and need not be specifically mentioned. But the names of a few, of different countries, who have achieved a world-wide celebrity ought to be held in honourable remembrance. George Stephenson stands in the first rank, for his earlier years were spent in unremitting toil as a miner and engineer. Lincoln, Grant, and Garfield, Presidents of the United States, were in youth accustomed to manual labour of a kind which attracted little regard and but a very modest remuneration, yet the honour in which these men's names are held will last for ages. Burritt, the American blacksmith, not only did a good day's work at the anvil, but found leisure to study, to learn languages, and to write for the good of his fellow-men on both sides of the Atlantic. Another American, Benjamin Franklin, began life as an errand boy in his father's shop, was then apprenticed to a printer, and after a long and useful career acquired wealth, became a man of note in science, and representative of the United States as Ambassador to France. Hugh Miller, in Scotland, while working as an operative stone-mason, studied geology, and subsequently took a high place as a literary man. His testimony is of great value in relation with this subject. He declares that his experience has not shown "that there is any necessary connection between a life of toil and a life of wretchedness;" and he further remarks, "when I have found good men anticipating a better and a happier time than either the present or the past, the conviction that, in every period of the world's history, the great bulk of mankind must pass their days in labour, has not in the least inclined me to scepticism." Hundreds of similar examples might be cited to show that a life of labour may be honourable in itself, and a stepping-stone to higher

honour. Those already mentioned will, however, be sufficient for our present purpose.

On behalf of those who, by choice or necessity, are destined to a life of labour, it is desirable to show how the worker with the hands may be not less deserving of honour than the worker with the brain. The difference between the two, when any exists, will depend entirely upon the manner in which the work is done. Each, to be worthy of honour, must be characterised by certain qualities—the same, in fact, as are required to secure public esteem in any walk of life.

In the first place, manual labour, to be successful and honourable, must be honest. There must be no pretence. Every one concerned must be able to place implicit confidence in the work. If a man works at making boots, and makes them well, supplying good materials and good workmanship, he will be entitled to respect as an honest workman, and he will be honoured and sought after accordingly. The dishonest workman, on the other hand, will meet with a very different fate. If he give inferior material and poor workmanship, under the pretence that both are good, he certainly will not be honoured. The fraud will soon be detected, and the disesteem in which he will consequently be held will not arise from his being a bootmaker, but from his being a dishonest bootmaker. In many a country town in the colony there is a tradesman—a saddler, let us suppose—who is known far and near for the excellence of the articles he makes, and whose saddles are sought for by rich and by poor. How has his reputation been obtained? Simply by the honesty of his work. A purchaser knows that by applying to such a workman a good serviceable article will be supplied, excellent in material and workmanship, and not a sham.



Work, to be deserving of credit, must also be intelligent. It does not suffice to endeavour honestly to produce good work, though that is a good and honourable effort; but there must also be a rational attempt to do it in the best, that is, the most intelligent manner. A man may find it necessary to earn his living by breaking stones for roadmaking; and though this is not generally considered an occupation requiring much intelligence, he may exhaust himself in his efforts to accomplish an honest day's work, and yet fail, because of insufficient knowledge and thought about the process. There is even in breaking stones a better way than any other; but, to discover and practise it, the nature of the stone, and the cleavage or manner in which it splits, have to be considered, as well as the mode in which the hammer stroke has to be directed, so as to produce the greatest effect. All this requires thought and power of reasoning; and when these are employed, even stone-breaking becomes a respectable occupation. The same principle applies to every other legitimate occupation, whether of hand or brain. A barrister, for example, may honestly strive to gain his client's case, but if he possesses only an imperfect knowledge of law, or if he be incapable of bringing his knowledge to bear upon the points in dispute, he will fail. His work will not have been done with intelligence, and ultimately he will cease to be held in esteem, or to be employed.

A third requisite of honourable work is thoroughness, which presupposes honesty of intention and intelligence of execution. It makes a further demand, however, for sustained industry. This will be seen if we apply these principles to the building of a wall. The honest workman will reject all improper material—rotten bricks, bad mortar, to say nothing of the rubbish which the



fraudulent sometimes use to “scamp” their work. If he be intelligent he will take care that the bricks are well and truly laid, with proper bond and joints, so that the wall shall be firm, compact, and upright. But he must also be industrious, not wasting time in gossip with his fellows, or in smoking his pipe, but working with such a well-regulated energy that when the hours of labour have expired, he may be able to conscientiously declare that he has done a good day’s work. Such a workman has an indisputable testimonial in his own work, to which he can appeal with satisfaction and pride. He is also respected by his fellow-men, who show him the highest honour by trusting him in whatever he does.

Work of any kind, even the humblest, when performed in this manner will infallibly secure esteem, and render the workman honoured by all who know him, and in this way help to render his career successful. While he is thus drawing honour to himself, he is at the same time conferring honour upon the class to which he belongs, and raising it in public estimation.

One of our greatest English poets has summed up the whole matter into two pithy lines, which are worthy of a place in the memory of every boy and girl, as well as of their elders :—

“Honour and shame from no condition rise,  
Act well your part, there all the honour lies.”



## LESSON XLIX.

## PUNCTUALITY.

Punc-tu-al-i-ty.

Pre-ci-sion.

De-fault-er.

In-ad-vert-ence.

Borne.

In-con-ve-ni-ence.

In-di-vid-u-al.

Pro-mis-sor-y.

Ap-per-tains.

Sys-tem-at-ic-al-ly

In-su-per-a-ble.

Con-spic-u-ous-ly.

PUNCTUALITY is a virtue, by means of which the work of the world is carried on with regularity and precision. Without it business of every kind would soon fall into confusion, and almost cease to exist; law would speedily fail in its operation, and commerce would be reduced from a thoroughly organised system to a rude description of barter. In the absence of punctuality, even the affairs of a school and the lessons of scholars would lose much of their effectiveness. To do what is required at the appointed time, whether it be a day, an hour, or a minute—that is punctuality. For example, the law may require a man to perform a certain act, such as giving up possession of a house by a certain day. If the house be not so given up on that day, the law provides a punishment for the defaulter, even if he were willing to have complied with its injunctions, and failed only by inadvertence. Again, a tradesman may promise to pay a certain sum of money on a certain day to a merchant. If that sum be paid by twelve o'clock on that day, the tradesman is punctual; if he fail, however praiseworthy his intention may have been, certain unpleasant consequences have to be borne. Two men may appoint a time and place at which they shall meet. He who presents himself at the appointed place at the nearest moment to the stated time, is the more punctual. In cases of this kind the man who comes before the appointed time is unpunctual. It is true that he may not greatly inconvenience

his companion, although he must cause some waste of time.

In urging the necessity for punctuality, it would be easy to show the great evils that have resulted from the want of it, both to individuals and communities. How many persons have missed a train or a steamboat by arriving at the place of starting half-a-minute later than the appointed time, and thus lost opportunities that could never be again placed within their reach! And how much anxiety, loss, and suffering have been caused to others by neglect to keep appointments at the time agreed upon! Battles have been lost because portions of armies have failed to take up their appointed positions in the fields at the appointed times. Ships have been wrecked through the loss of a few minutes in reaching a particular spot; and railway trains have been destroyed through the unpunctuality of a pointsman. But the best illustration, perhaps, of the necessity for punctuality is that which is furnished by our business arrangements. A merchant, we will suppose, imports from other countries commodities to be paid for on a future day, and for which he gives a "promissory note," that is, a formal promise to pay at a given time and place. These commodities he sells to storekeepers, receiving from them promissory notes for the amounts of their respective purchases. The merchant depends upon these promissory notes to supply him with money to enable him to discharge his own liability. If the money be paid at the appointed time, all is well; if not, the want of punctuality in payment leads to the following results. The storekeepers who failed to meet their engagements lose their "credit"; that is, goods will not be supplied to them again unless paid for at the time of purchase. Further, they are liable to be brought

before a court of law and compelled to pay, or to give up their property to their creditors. If the storekeepers who fail to pay owe a large sum to the merchant, the latter may be embarrassed; in other words, he may find great difficulty in finding money to discharge his own promissory note. He may even be forced to suspend payment, from inability to obtain the money he requires, and thus his credit may be shaken. Thus it will be seen that the whole arrangement depends upon each person keeping his engagement to pay punctually.

Punctuality is also a duty. We owe it to each other to keep our appointments with scrupulous punctuality. It is the duty of the scholar to be punctual in his attendance, in the same measure as it is the duty of the teacher to be punctual in the conduct of the school. A little inquiry will show that the same duty appertains to every individual in the community, whether his position be high or low, public or private. The clerk, the business man, the magistrate, the clergyman, the artisan, the labourer, and the household servant, all ought to be punctual. They owe it to themselves and to their own characters, as men of business who understand the value of time, and as men of sense, who will not waste what is so valuable. They should also feel that it is a breach of good manners to keep others waiting beyond the appointed time, whether such persons be above or below them in social position. It is said of Queen Victoria that she is systematically punctual, and dislikes to keep any of her subjects waiting in any of her public appearances.

While punctuality is a duty we owe ourselves, it is also, and in a special manner, our duty to all with whom we are brought into contact. We are bound to avoid all risk of trying the temper of those we are to meet, of

causing them anxiety or trouble, and of wasting their time. If we owe them money we should strain every nerve, and hesitate at no sacrifice to pay with punctuality. Thus, whether it be a matter of rigid honesty or only of common politeness, the practice of punctuality is equally incumbent upon all.

To some persons punctuality presents great, if not insuperable difficulties; they appear to find it impossible to keep their engagements, whether relating to time or money. Such persons will generally be found to possess a character marked by a serious defect, the absence of firmness or resolution. They would like to be punctual, and, in fact, to discharge all their other duties, but they cannot make up their minds with sufficient rapidity and firmness to allow of their keeping an appointment, or they allow matters to intervene and divert them from their purpose. Considering, however, the obvious advantages of punctuality, it is somewhat remarkable that more strenuous efforts are not made to secure and enjoy them. In the endeavour to be punctual, a general bracing up of the whole character takes place. A fixed purpose is formed, and a steady resolution to attain it follows. Thus the mind is trained to act with the firmness and decision which are such important elements of success in the business of life. This is fully recognised by all who are capable of judging, for they respect a punctual man and regard him as worthy of high honour. His example is cited as that of one whose character is worthy of imitation in this respect, and his weight in matters of business is fully acknowledged.

The advantages of punctuality are conspicuously shown in the management of railways. A fixed time is appointed for the departure of every train, and for its arrival at every other place along the line. So long as



these times are punctually observed, one entire class of dangers to which railway travelling is liable is rendered impossible, and the risk of others is greatly diminished. Passengers reach their destinations at the time expected, their subsequent arrangements are not interfered with, and their business or their pleasure is not marred by delay and its consequent annoyances. In fact, we cannot fully appreciate the advantages of punctuality in this kind of travelling, unless we can imagine a railway carried on without it, and without fixed times for any of the necessary operations of such a means of locomotion. In that case, the delays, the confusion, the accidents that would inevitably ensue, would speedily prove that punctuality is both necessary and advantageous. A similar remark applies to postal arrangements, in which punctuality in the delivery of letters is a point of the highest consequence.

It might even be said that, like order, punctuality is one of the laws of the universe. The sun, the moon, the stars, the tides, all move according to their appointed times; and so exactly punctual are they in their movements, that the time when any one of them will reach a given place may be calculated with certainty years beforehand. Even the comets, those apparently eccentric visitors to our system, are punctual.

Those to whom punctuality is not habitual should strive with might and main to accustom themselves to it, as a matter of duty and conscience, as a point of courtesy, and as an advantage in business. The task is not easy, nor is the habit to be acquired in a day. Many efforts are necessary, many self-conquests must be achieved, and many temptations thrust aside, before the unpunctual man can rid himself of his vice. To such a man the greatest enemy is, perhaps, his own vanity.



He thinks the duty to be performed can be as well discharged a little later; he is so apt that he can easily make up for a little lost time; or he is sure no one will take offence at being kept waiting for a few moments by him; and it is not until losses and suffering have resulted from his want of punctuality that he awakes from this delusion. To be a punctual man, begin to practise the virtue as a boy, and let it be plainly seen in your attendance at school.

---

LESSON L.

## INSECT VERMIN.

Mos qui-toes.	Syr-inge.	Com-mu-ni-ties.
Com-par-at-ive-ly.	Mi-gra-to-ry.	Er-ro-ne-ous-ly.
Mul-ti-tu-din-ous.	Nox-i-ous.	Stren-u-ous.
Bril-li-an-cy.	Mis-chiev-ous.	Par-a-sit-ic.

UP to the present time, Australia has been comparatively free from the ravages of the insect pests which, in other countries, have so seriously diminished the supply of food by their attacks upon cultivated plants. Potato crops have not been destroyed by the Colorado beetle, nor has the locust devoured every green leaf of the growing corn. Even the vines have been spared from the depredations of the phylloxera, though this destructive insect has at least gained a footing in some districts. Of flies and mosquitoes, not to mention any viler torments, Australia possesses an abundant supply; but contrasted with other parts of the world, this continent must be held to be favoured even in this particular.

Among the multitudinous insect tribes, there are many that cannot be charged with inflicting injury upon man in any shape. It is true that some are displeasing to the eye, though all do not offend in this respect, for not a

few are worthy of the greatest admiration for the beauty or singularity of their forms, or for the brilliancy of their colours. Others, however, are in some way noxious. One class attacks vegetable growths, injuring them in a greater or less degree, while another renders itself annoying to the human species. It is our intention to give a brief account of these two classes of insect vermin.

At certain periods, plants will appear covered with small green insects. Rose trees, for instance, will be found with their young shoots and leaves completely enveloped with these insects; and so sudden is their advent, and so vast their numbers, that the observer is at a loss to account for their appearance. Some of these insects will be found to possess wings; others are destitute of these appendages. They live upon the juices of the plants upon which they settle, the mouth being formed for suction. In common language, these little creatures are called "plant lice;" their scientific name is aphides (singular, aphis). Many curious and interesting facts have been observed by naturalists respecting the aphides, especially their astonishing fecundity. Regarded as vermin, however, it is a question of greater moment how to diminish their numbers or drive them away altogether. When dealing with a few rose-bushes, it is not difficult to exterminate them, without injuring the plants, by means of water applied with a syringe. When, however, as sometimes happens, a whole crop of cabbages or cauliflowers, to which the aphis is most partial, is attacked, there seems to be no effectual remedy. In that case, the best course is to pull up the plants by the roots and throw them to fowls or pigs, as, deprived of their juices by the insects, they soon assume a sickly appearance, and fade away. Sometimes the aphides disappear as suddenly and unaccountably as they came.

To a limited extent, small birds are useful in destroying them.

The migratory locust seems to be restricted to Africa and Southern Asia, but it is represented in some parts of Australia by a grasshopper, which devours the pastures as completely as the former clears away vegetation of every kind. The grasshoppers appear in countless swarms, not flying in clouds like the locust, but moving for short distances in flying leaps. Not a blade of grass is left behind them; and as they approach cultivated districts, great difficulty is experienced in preventing them from settling on the crops, and depriving the farmers of all prospect of a harvest. There appear to be at present no means of preventing the mischief caused by the grasshoppers.



LOCUST.

One of the most destructive insects known is the phylloxera, which attacks the roots of the vine. This little creature undergoes numerous metamorphoses, and appears to be equally mischievous in all its forms. As it lives underground, its proceedings cannot be observed, and generally its presence is unknown until the death of the vine indicates the existence of the concealed devastator. The amount of damage caused by this insect is immense, and the only remedy appears to be the destruction of the affected vines.

Occasionally, in isolated spots, crops are destroyed by swarms of grubs, but there seem to be no destructive insects which prevail over extensive areas. Sometimes fruit trees are attacked; in other cases, green crops suffer; but as, in both instances, the visitation is usually of a transitory nature, the character of the depredators has not been studied with a view to discover either a preventative or a remedy.

Although the so-called white ants feed upon vegetable matter, they do not attack living plants, and would not therefore be entitled to a place in our list of vermin, but for their great destructiveness to the woodwork of our houses. In their natural state, their food consists of the trunks of dead and decaying trees, the softer parts of which they completely devour, leaving the harder portions to form the galleries through which they travel when performing their allotted tasks. When, however, they have effected a lodgment in the timber of a house, they follow the same course, eating out all the soft parts till nothing but a shell is left. Thus weakened, the timber is liable to give way, and the house becomes unsafe. They cannot be dislodged; the infested wood must be wholly removed, or left to be destroyed. It is said that their attacks can be prevented by saturating the timber about to be used in a building in kerosene or kerosene oil. Though they live in communities like ants, and have many similar habits to those creatures, white ants are erroneously so named, their proper designation being *termites*. True ants and termites belong to two very different orders of insects; the former are related to bees and wasps, the latter to dragon-flies and may-flies. In passing through the bush, the habitations of the termites may often be observed. These structures are formed of particles of earth or clay worked up into a substance of

extreme hardness, and often rise to a height of five or six feet. Within these ant hills, the termites live in organised communities, each of which consists of a king, a queen, soldiers, and workers, to each of which classes a distinct function is assigned. In this respect, they resemble ants and bees; and while we are compelled to use the most strenuous exertions to compass the destruction of such as intrude within our dwellings, we cannot but admire the apparent intelligence and order with which the work of a termitarium—the habitation of termites—is constructed.

Ticks, though not insects in the scientific sense of the word, may, for our purposes, be so accounted, and placed in the list of those which are injurious to animals. They generally inhabit thick scrub, but attach themselves, when opportunity offers, to the bodies of horses, cattle, sheep, or dogs. The latter are said to be great sufferers from the effect of tick bites, and even human beings are not exempt. The ticks remain fastened by means of their suctorial mouths to the animals to which they have attached themselves, and even burrow beneath the skin, causing painful and even dangerous swellings. Even when observed at an early stage of their attacks, they are not easily detached, as the structure of the mouth enables them to maintain their hold with great tenacity.

Doubtless the mosquito has its use in creation, but what that use may be has not yet been discovered. The annoyance and even sickness caused by the various species of this insect are no matters of uncertainty. They are rarely met with on the table-lands, but abound in the lower and warmer parts of Australia, some inhabiting the bush exclusively, and others intruding into our dwellings. Water being necessary for their propagation, they are always most numerous in wet seasons,



and in the vicinity of rivers and marshy places. At night, the creature's hum prevents sleep, and its bite, especially in the case of children and new-comers, is apt to cause itching, and even festering sores. Notwithstanding this fact, the Australian mosquito is harmless compared with others of the tribe found in tropical countries.

Another insect which attaches itself to mankind, as well as to the lower animals, is the flea. The different species of this lively little creature are parasitic upon various animals, from which they draw blood by means of their suctorial mouths. When they have once entered a house it is difficult to expel them. No effectual means of ridding the house and its inhabitants of the nuisance is known, with the exception of the most rigid cleanliness. The flea lays its eggs on the floors, in the carpets, in cracks in the boards, anywhere, in short, about the house. From the egg, when hatched, proceeds a minute grub, which changes into a pupa (or chrysalis), and finally the complete insect emerges from the case, ready to attack any animal within its reach. By constant sweeping, brushing, and scrubbing with hot water and soap or soda, the eggs and larvæ are removed or destroyed; but if these measures are neglected, the house will speedily be overrun. It is well known that empty houses, in which cleansing operations are not regularly carried on, soon swarm with fleas, although their natural food appears not to be accessible in such cases. Unlike the tick, the flea, when it has satisfied its appetite, relaxes its hold and discontinues its blood-sucking operations, so that its victim has some respite from persecution. Another kind of flea, found in the West Indies and South America, and called the chigoc or jigger, is far more troublesome, for it burrows into the flesh and causes wounds that are difficult to heal.

The bug, with its disgusting odour, is another household nuisance, and its presence is generally, but not invariably, a sign that cleanliness is not fully regarded by the family. One species, at least, is indigenous to Australia, living in the bark of trees. Hence it may be carried with timber into an entirely new house, the first occupants of which, however scrupulous in respect to cleanliness, may find themselves subjected to great annoyance from these vermin from the moment of entering into possession. Various nostrums have been offered for sale as certain to exterminate these creatures. But little reliance can be placed in such preparations, however, minute, constant, and careful search seems to be the only effectual manner of securing their complete extirpation.

The "busy, curious, thirsty," and, it may be added, hungry fly is so familiar a torment that we have some hesitation in reckoning it among vermin. Yet it is perhaps the most troublesome of all the Australian insects. Out of doors it plagues both man and beast. It invades the ears, the mouth, the nostrils, and especially the eyes, with an irritating persistence that renders the continued motion of the hands necessary for defence against its assaults. At home, besides these annoyances to our persons, it defiles our walls, ceilings, curtains, and bedclothes. It intrudes into our food and drink upon the table, and infests our store-rooms and pantries. Everywhere its intrusive and unwelcome presence makes itself unpleasantly felt. There is, moreover, reason to believe that it assists in spreading contagious diseases, such, for instance, as ophthalmia. No effectual means of ridding ourselves of this plague are known, nor is it likely, considering the overwhelming numbers to be dealt with, that more can be done than to abate the nuisance. By keeping our rooms in comparative darkness, and by con-

stant attention to cleanliness, the annoyance may be greatly mitigated; and further relief may be obtained by hanging up branches of the gum and other trees.

The last kind of vermin we shall mention is one, the very name of which is heard with abhorrence. This insect, the common louse, is generally looked upon as an evidence of filthy habits and disgusting want of cleanliness. It is parasitic, infesting the heads of dirty people and eating away portions of the skin. The wounds thus made are sometimes difficult to heal, but, in general, the constant and liberal application of soap and water is sufficient to destroy all traces of this parasite.

It will be seen from the foregoing remarks that, while not free from insect plagues, Australia is, on the whole, highly favoured in this respect,—the vermin which do exist within her borders being neither so destructive nor so annoying as those which are found in some other countries.

---

## LESSON LI. 51

### FOODS OF DIFFERENT NATIONS.

En-gross-es.	Pre-vails.	Es-qui-maux.
In-dif-fer-ence.	Se-ri-ous-ly.	Ab-hor-rence.
In-gre-di-ent.	Ab-or-i-gin-es.	Ce-ta-ce-an.
Nour-ish.	Mar-su-pi-als.	Rig-our.

THERE is no subject which engrosses so much of the thought and time of mankind as that of food. It is a matter of indifference to none, while to most it is one of vital necessity. From the Arctic snows to the burning sands of the tropics men spend a large portion of their lives in seeking, preparing, or consuming food.

In considering the different substances used as food, we shall be struck by their amazing variety. But by

regarding them in classes, as they are usually arranged under the heads of animal, vegetable, and mineral foods, we shall be able to form a fairly accurate notion of the principal articles included in each of these divisions. Before proceeding further, however, it is desirable to point out that, in the proper sense of the word, no food is obtained from the mineral kingdom. Salt and earth, the two mineral substances consumed as food, contain no ingredients that nourish the human frame, the former being merely a condiment, and the latter a substitute which, when swallowed, by distending the digestive organs, diminishes the feeling of hunger, that is, the desire for food.

As a general rule, the kind of food used in any country depends upon its climate. Accordingly we find that in the cold polar regions the diet of the inhabitants is almost exclusively animal; in temperate countries a mixed diet prevails, partly animal and partly vegetable; while in the tropics vegetables constitute well-nigh the sole description of food consumed by the people. A few remarkable exceptions do not seriously disturb this rule. Our Australian aborigines, before the advent of the white man, were possessed of few edible vegetables, and their food, notwithstanding the heat of the climate, was limited, as a rule, to the animals they were able to kill or capture. It must not be overlooked, however, in connection with this point, that the marsupials of Australia supply little or no fat, differing widely in that respect from the animals which form the principal food of the dwellers in Arctic regions. To that extent the departure from the general rule is rather in appearance than in reality. Some African tribes also consume large quantities of animal food, although inhabiting a hot climate.

Another general rule regarding food is, that food produced in any country, or in another possessing a similar climate, is the best adapted to that country. The productions of tropical regions are best fitted for consumption in countries within the tropics; and the vegetable and animal foods of the temperate zone are better suited to it than to any other part of the world. If a native of Bengal were asked to partake of the ordinary meal of an Esquimaux, he would probably be too much disgusted to comply; and, if able to overcome his abhorrence and eat a portion of the seal's flesh and blubber, he would be likely to become seriously ill. The correctness of this rule is not affected by the fact that tropical products are largely consumed in temperate countries. For example, arrowroot, sago, tapioca, and other vegetable foods grown in very warm countries, are used to a great extent in Europe, but they do not form the staple food of the people, being regarded as dainties or luxuries when not prepared for the sick. A similar remark holds good with respect to tropical fruits, such as the cocoa-nut, and also to the pine-apple.

In illustration of the first general statement, it may be pointed out that, in countries situated within and near the Arctic Circle, in Greenland and the northernmost parts of America and Asia, the staple food of the inhabitants is the flesh and blubber of various cetacean animals, the seal, the walrus, and occasionally the whale. All these animals have, under the skin, a layer of fat or blubber, which is eaten with the flesh. Each person consumes enormous quantities of both, and this diet, so far from being injurious to health, is found to be necessary to enable the system to resist the influence of the cold which prevails at all times, but which becomes most terrible during the long dreary winter. Even Europeans, after



a little experience of the rigour of the climate, feel no reluctance to partake of such food, and gradually enjoy it and thrive upon it as fully as the natives.

Coming now to temperate countries, it will be found that a mixed diet prevails, to which not only vegetables contribute, but also the denizens of the forests and fields, the air and the waters. For richness and variety this diet is not equalled by any other part of the globe, not even the tropics, with all their luxuriance of growth and fertility of production. Various *grains*, including rye, barley, oats, wheat, buckwheat, and maize; *pulse*,



OATS.

as peas, beans, lupins, and lentils; *bulbs and tubers*, as onions, potatoes, and Jerusalem artichokes; *roots*, such as radishes, turnips, carrots, and parsnips; *green vegetables*, under which head may be mentioned cabbage, cauliflower, lettuce, celery, and herbs; and *fungi*, the mushroom, truffle, and others—all these are used in various quantities and proportions. Fruits also form an important part of the food of the dwellers in temperate countries. It is only necessary to mention the more

common of these to show how much is owed to fruits in this particular. The apple, pear, orange, lemon, plum, cherry, currant, gooseberry, raspberry, grape, and olive, all contribute in some form to the food of these parts of the world. Nor is the amount and variety of food supplied by the animal world less remarkable. Oxen, sheep, pigs, deer, hares, rabbits, among quadrupeds; of birds, the turkey, goose, duck, fowl, pheasant, partridge, grouse, and a multitude of smaller species; of fish, the cod, turbot, haddock, herring, hake, ling, sprat, tunny, and anchovy, not to mention numerous other kinds. Oysters and other shell-fish must not be overlooked, however, nor should honey, the chief insect product, be forgotten. These remarks apply principally to the north temperate zone, but they are true also regarding the south, there being necessarily some variation in details. In both zones it will be found that the influence of a mixed diet, combined with that of climate, produces the most vigorous races of mankind, whether regarded intellectually or physically.

In tropical and sub-tropical countries, the staple food of the people is almost exclusively vegetable. Thus, millet and dates are consumed in Arabia and North-eastern Africa, and rice in India, Burmah, Siam, and the southern portions of China and its dependencies. In the hotter parts of America and Africa, and in the East Indian Archipelago, bananas of different kinds form a large proportion of the diet. Sago and arrowroot are produced in other tropical regions, the former in Africa and New Guinea, and the latter in America and some of the Polynesian Islands. In the latter the bread-fruit is extensively used, and is said to be even more productive as a food plant than the banana. The sweet potato and the yam are principally grown in the warmer parts of

America, and in the East Indies and the South Sea Islands.

While, as may be seen from the foregoing illustrations, the general rule holds good over most of the earth's surface, there are nevertheless many striking exceptions and peculiarities, some of which we proceed to mention. Reference has already been made to the practice of eating earth. In some instances, as among some of the African negroes, the habit is caused by a morbid desire for the earth or clay, which is, therefore, not swallowed for food. A similar habit is known to prevail among white people in certain parts of America, where it is regarded as a disease. There appears to be no doubt, however, that some Indian tribes in South America actually devour clay in large quantities in those seasons when their ordinary food is scarce or not procurable. Under the same circumstances the natives of the Aleutian Islands have recourse to a kind of sea-weed; and Arctic travellers have found a lichen a not unsatisfactory food in the absence of any other. The Australian black varies his diet of opossum and kangaroo with the so-called yams and indigenous berries. Towards the interior of the continent the seeds of a plant called nardoo are collected for food by the natives. But the most important food plant native to Australia is the bunya banya, a species of pine peculiar to Queensland, the seeds of which are gathered and eaten during the season by the aborigines, who make the harvest an occasion for holding a festival. Another pine furnishes food to the inhabitants of the western slopes of the Andes of Patagonia and Chili.

Insects are not generally regarded with favour as an article of diet. Nevertheless, white ants are eaten in some parts of Africa, and, when roasted, are reputed to be nutritious and of a pleasant flavour. Not less so are

the locusts in Northern Africa and some of the islands to the north of Australia. In New Zealand, as well as in Australia, certain white grubs found in trees are considered as dainties by the native tribes, and white men who have tried the experiment of eating them have pronounced them sufficiently palatable. At certain seasons the blacks inhabiting the western slopes of the Muniong Range eat freely the large moths which at such times abound upon the hills. Their partiality for snakes and lizards is well known, and is paralleled by the liking manifested by both whites and Indians for the Mexican iguana, a lizard of decidedly uninteresting appearance. Snails not unfrequently make their appearance on the dietary list in France and Switzerland; but however unpleasant these creatures may appear to us, they are decidedly exceeded in this respect by the sea-slug or *beche de mer*. This animal inhabits the seas to the north of Australia, and is gathered by divers from the bottom. When dried, *beche de mer* is exported to China, where, like the swallows' nests, it is used for making soup. Still more unprepossessing as an article of diet is a worm found in some of the islands. This worm makes its appearance in great numbers on the coral reefs in October and November, and is taken in large quantities with nets. When cooked it is highly appreciated by the natives.

The shark is not generally considered an appetising fish, though it is eaten by the Maoris and by the inhabitants of many of the Polynesian Islands. With a few exceptions, fishes are wholesome food; and the shark, in spite of some drawbacks, is regarded with high favour by those who are accustomed to its flavour.

Among quadrupeds none seem more repugnant to human notions, when viewed as possible articles of food,

than monkeys. They are nevertheless used in South America, though, from their resemblance to the human form, strangers have much difficulty in persuading themselves to partake of any dish in which they are an ingredient. And this brings us to speak of the horrible practice of cannibalism, that is, the use of human flesh as food. Formerly prevalent throughout the greater part of Oceania, including New Zealand, it is now restricted to the Solomon Islands, and some smaller groups, to which the restraints of civilization have not yet been extended. In Central Africa, also, cannibalism still prevails, men and women being killed for the purpose. There are some tribes, however, which restrict their feasting upon human flesh to the bodies of such as have died natural deaths, or have been slain in battle or by accident.

---

## LESSON LII.

### MAGELLAN'S VOYAGE.

Ro-tun-di-ty.  
Pro-ject-or.  
As-so-ci-ate.  
Nau-tic-al.

Per-ceive.  
De-mean-our.  
Con-cil-i-a-to-ry.  
Lu-cra-tive.

Squad-ron.  
Feat.  
Mau-age-a-ble.  
Shoal.

THE voyage of Magellan was a practical demonstration of the rotundity of the earth; and, considering the period when it was undertaken, must be regarded as indicating the possession of undaunted courage on the part of its projector and his associates. America had been discovered about a quarter of a century before, but none of the Spanish voyagers had yet explored its southern coasts or ventured into the Pacific Ocean.

Ferdinand Magellan, as he is usually styled, though his proper name was Magalhaens, was a native of Por-



tugal. He was possessed of some military skill and experience, having served against the Moors. He had also acquired considerable knowledge of nautical affairs, and had voyaged as far as the East Indian islands. Though short of stature and lame, he was well fitted to command, being cool and courageous in time of difficulty or danger, and quick and steady to perceive every indication of approaching trouble. At the same time, his temper was genial and his demeanour conciliatory, so that he was able to gain the good-will of those placed under his command.

At that time the two great maritime nations of Europe were the Spaniards and the Portuguese. The latter, after the discovery of the Cape of Good Hope, had prosecuted their discoveries in the east, and had formed settlements in India and the East Indian islands. With these settlements a lucrative commerce had sprung up, and practically the whole trade of the east was in the hands of the Portuguese. On the other hand, the Spaniards had sailed westward and founded colonies in the West Indies and America. Although these countries contained great wealth, which served to enrich the Spanish government and people, the Spaniards were jealous of the Portuguese, and envied them the possession of their eastern settlements. The latter in their turn were equally jealous of the Spaniards, and both nations were ever on the alert to injure each other. At this time Magellan, whose offer to lead an expedition westward to India, had been rejected by the authorities of his own country, submitted his proposal to the Spanish government. Contrary to the generally received opinion of the time, Magellan held that it was practicable to reach India by sailing westward as easily as it had already been reached by sailing eastward. Animated, no

doubt by the hope of acquiring new territories in a part of the world supposed to be teeming with riches, Charles the Fifth of Spain and Emperor of Germany entertained the proposal of Magellan, and furnished him with a squadron of five ships and two hundred and thirty men. Provisions were supplied for a voyage expected to extend over two years.

At the present day a voyage round the world is looked upon as an ordinary feat, which many men perform several times in the course of their lives. Such a voyage has been proposed as a pleasure trip, to occupy about eight months, and allowing the excursionists time to visit the more remarkable maritime cities of the world. No more apprehension of danger would be felt in this case than in a voyage to the Mediterranean; the table would be as well supplied as if the party were ashore in a large city, and the arrangements for the comfort of passengers would be as perfect as the limited space available in a ship would permit. In the time of Magellan, however, matters were very different, and it is difficult for us to understand fully the intrepidity of the men who ventured upon long voyages. To begin with, the vessels of the day were small, ill-constructed to contend against the storms and buffetings of an ocean voyage, and from their structure, liable to become unmanageable in rough weather. Moreover, the art of navigation was little understood, while the mariners were generally inexperienced and unskilled. Hence the liability to shipwreck was very great, and those who were bold enough to hazard a long voyage were looked upon as men who had ventured upon some desperate enterprise. To these dangers must be added the risk incurred in the navigation of unknown seas. At the present day almost every dangerous rock, shoal, and

current has been noted, its exact position determined, and all laid down in charts for the guidance of the navigator. These advantages were wanting to the mariners of the middle ages, and the prospect of being dashed to pieces upon an unknown rock, stranded upon an undiscovered shoal, or carried away out of the true course by a current not previously calculated upon, was alarmingly common. Supposing these dangers to be safely avoided, another, not less formidable, presented itself—that of dying of starvation. Sufficient food for a protracted voyage could not be stowed away in the small vessels then used, and the crew could calculate that some of their number would certainly perish from this cause, and that others would suffer permanent injury to the constitution. The want of fresh vegetable food produced that terrible disease the scurvy, which continued to be the bane of seamen until Captain Cook, about two hundred and fifty years after, showed how, by the free and regular use of lime juice, its ravages might be stayed. When to all these circumstances there is added the terror inspired by the uncouth and savage inhabitants of some of the newly discovered lands, the unfamiliar aspect of the ocean in portions traversed for the first time, and the occurrence of storms in seasons in which hitherto gentle breezes and fine weather had been found to prevail, it will be obvious that such a voyage as that proposed by Magellan must have appeared to his associates to be a desperate undertaking.

Undaunted by the prospect of encountering such dangers, Magellan set sail with his squadron on the 10th August 1519. The progress of the little fleet was very slow. Fast sailing was not a merit of the ships of that day, but those of Magellan were singularly unfortunate or unusually slow. The fiftieth day at sea found the ex-

pedition near the Cape de Verde Islands, after which it reached the equatorial calm belt, and lay becalmed for seventy days. At length a favourable breeze wafted the adventurers to the coast of South America. Touching at various places and obtaining supplies of fruits and food, they anchored near the mouth of a large river, probably the La Plata, where they found the natives upon the beach to be people of great stature and savage aspect. After a brief stay in this place, Magellan resumed his voyage, and proceeded southwards as far as the fiftieth parallel, where he was met with opposing winds and stormy weather. So slowly had the vessels progressed that, by this time, winter had set in to the great astonishment of the crew, who had expected to find the same summer season in that part of the world as existed in Spain during the same months. Magellan therefore determined to take his ships into harbour and wait the return of fine weather, which he imagined would soon arrive. Though disappointed in this respect, the delay afforded the voyagers an opportunity of becoming acquainted with the natives of that inhospitable region, which was a portion of the country called Patagonia. Then, as now, the inhabitants were men of unusual stature, and possessed of great strength and activity. In recent times, however, no individuals have been found whose proportions so far exceeded the average of Europeans as those described by the Spaniards. One man specially mentioned in the account of Magellan's voyage is said to have been of so great height that the tallest of the Spaniards reached only to his waist. Here, also, the alpaca was first seen, and caused considerable astonishment by its peculiar appearance and habits. Magellan formally took possession of the country for the King of Spain, and entrapped two of the Patagonians with a

view of exhibiting them, on his return to Europe, as trophies of his voyage.

Before prosecuting his researches any further, Magellan was called upon to confront another difficulty of a serious nature. The captains of two of his ships headed a mutiny of many of the men against his authority. Their intention seems to have been to seize the ships, and either continue the voyage on their own account, or return to Spain with the intelligence that the expedition had failed. Being supported by a majority of the adventurers, Magellan seized the principal leaders of the mutiny, and caused them to be tried by a council of war. They were found guilty, and Magellan immediately executed the sentence of the court. One captain was hanged, and the other, with the remainder of the convicted persons, was sent ashore, and left to the mercy of the Patagonians.

Five months had been spent in this place, and after some unimportant occurrences, Magellan resumed his voyage. He was persuaded that a passage existed through the continent from ocean to ocean, and this passage he was determined to find. Every inlet on the coast therefore was carefully examined, and after the lapse of some months his perseverance was rewarded by the discovery of a considerable opening in the rocky and mountainous coast. Entering this inlet, the ships continued on their way; and as every successive mile was passed, the deeper Magellan's conviction grew that the long sought for channel was found. Success now seemed assured, yet at this time the pilot, or, as we should rather style him, the sailing master, proposed that the expedition should be abandoned, and that all should return to Spain. The reasons advanced in favour of this proposition were that the ships were old and unseaworthy, that



the two years' provisions were nearly exhausted, and that it was doubtful whether the newly found channel communicated with both oceans. Magellan at once declared that the expedition should be carried on at all risks, and threatened with death any person who should again mention the matter. Continuing his course westward, he found the channel to vary greatly in width, but to be nevertheless of such a character as to lead to the conclusion that it was the passage of which he was in search. Despatching two vessels to explore further, Magellan anchored and waited their return. His anxiety was increased by a storm, which led him to believe that their safety was jeopardised. After two days the ships returned, and the captains reported that a passage had been seen. The whole squadron then weighed anchor, and proceeded joyfully on the way until another passage was arrived at, opening in a different direction. The same two ships were then sent forward to explore. One of them returned. The other, on board of which was Gomez, the pilot, deserted. He had induced the crew to attack the captain and officers, and to confine them below deck, in order that they might be driven to consent to the proposed return to Spain. Tired of waiting, Magellan pursued his course, and at length, on the 28th November 1520, came in sight of the open sea. Thus, after more than a year of voyaging, with all its accompanying risks and privations, his prediction had been verified, and one of his principal aims accomplished. The passage was called by Magellan the Strait of the Patagonians, but it has since been properly named after its illustrious discoverer.

Stretching out boldly into the Pacific, Magellan finally directed his course northward, and sailed onward for many months. During the whole of this time, land was

sighted but twice. In each instance, the land discovered was a small island not deemed of sufficient importance to warrant delay. So calm was the sea, and so favourable the winds, that the ships sailed at an unusually rapid rate, and Magellan, from this circumstance, was led to designate the ocean as the Pacific. Subsequent experience has not justified this appellation, the Pacific being as liable to storms as any other portion of the great waste of waters, with the exception, perhaps, of the North Atlantic. While sailing pleasantly along, however, and enjoying the bright sunshine and gentle breezes, the crews were attacked by an enemy more insidious, but not less destructive than storm and tempest. Absolute want of food weakened those who did not die outright from starvation; and the want of fresh vegetables induced that horrible disease, the scurvy, which killed many, and incapacitated more for the performance of duty. Magellan was, therefore, very anxious to discover some island where provisions might be procured, and with that idea steered a westerly course after crossing the equator. Nearly four months after quitting the Straits, they arrived at a group of small islands, and obtained from the friendly inhabitants supplies of rice, yams, and cocoa-nuts, the precise description of food needed in their circumstances. The natives, although well disposed towards the adventurers, rendered themselves extremely troublesome by their habit of stealing everything that came in their way, and for this reason Magellan called these islands the *Ladrones*, that is, thieves or robbers. At length, the islanders committed a robbery of so much importance, that Magellan resolved to chastise them, and with this view landed with ninety of his men, burned some of the villages, and killed some of the natives. It is difficult to believe that he was

justified in this course, and, as might have been expected, the natives began to evince a more hostile spirit. Magellan therefore again resumed the voyage.

Once more setting sail, Magellan next landed upon one of the Philippine Islands. Here also the natives brought presents of food, and received their visitors in a most friendly manner. Though they wore but little clothing, they were well-behaved, and proved that they were not wholly uncivilised. Their fields were cultivated, various kinds of spices were grown, porcelain was used by the chiefs or rajahs, and golden ornaments were commonly worn. A similar reception was given to the Spaniards on visiting neighbouring islands, where the inhabitants were found to be of the same race. After some friendly intercourse and displays of power on the part of the Spaniards, the rajahs of some of the islands consented to pay tribute to the King of Spain, and to acknowledge his supremacy. Another chief having refused to submit, Magellan resolved to compel him by force, and accordingly prepared for war. Contrary to the advice of his officers, and in spite of the remonstrances of some, Magellan persisted in this design, ridiculing the idea that the native warriors, however numerous, could effectively fight with Spaniards in complete armour, and provided with fire-arms. This consideration seems also to have led him to decline the assistance of the chiefs who had submitted to him; and, with only fifty men, he landed on the island to contend against some thousands. He had miscalculated the effect his arrows and bullets would produce, as well as the bravery of the islanders, who rushed fearlessly to the attack. In a short time Magellan was wounded, some of his men were killed, and he gave the order to retreat. They made their way to the shore, fighting around their

leader, and the boats approached to the rescue. Magellan, who was desperately wounded, was unable to defend himself, and his men seemed to fail in courage at the vital moment. Getting into deep water Magellan fell, and numbers of the enemy rushed upon him; his own men, in their frantic haste to reach the boats, left him to his fate, and in a few moments he was dead.

Although, at the time of his death, Magellan had not accomplished all that he intended, he had shown that there was free communication between the two great oceans of the world, and that the East Indies could be reached by sailing westward, as well as by taking an easterly course. Had he lived to return to Spain, he would have been the first commander of an expedition that circumnavigated the globe; but owing to his untimely death, a subordinate officer, who led the remnant of the adventurers homewards, must be held to be entitled to that honour. One of the less important results of his voyage was the acquisition of the Philippine Islands by Spain.

Magellan's body was not recovered from the natives, who, emboldened by success, became actively hostile to the Spaniards. After further contests, in which the Spaniards lost more men, and their principal leader, it was resolved that the squadron should return to Spain. They accordingly set sail, and after touching at Borneo, the Moluccas, and other islands, the course was set for the Cape of Good Hope. The voyage was marked by the same incidents as the former portion—storms, mutiny, and starvation. Only one of the ships withstood the attacks of the sea or the assaults of enemies. This vessel, with eighteen men, under the command of Sebastian del Cano, safely reached Spain on the 6th September 1522, after an absence of three years.

## LESSON LIII.

## CLASSIFICATION OF PLANTS.

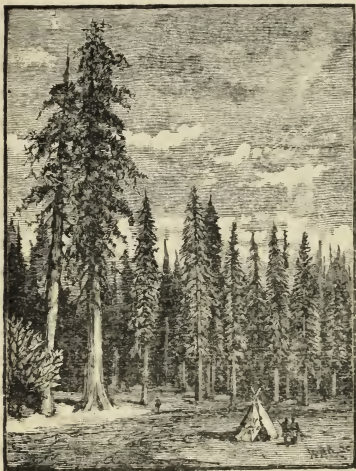
Suf-fice.	In-sig-ni-fic-ant.	Veined.
Fac-il-it-ate.	Cas-u-al.	Cyl-in-dri-cal.
Ac-ces-si-ble.	Pe-cu-li-ar-i-ties.	Sym-met-ry.
Ob-serv-ant.	Tis sues.	Cell-u-lar.

BOTANISTS assure us that about a hundred and fifty thousand different kinds of plants are already known to exist, and that probably others will be discovered when certain parts of the world, hitherto unexamined by scientific men, have been thoroughly explored. A whole life-time would not suffice to become acquainted with, much less to describe, so large a number of plants, even if they were all easily accessible. To facilitate the study, therefore, it is necessary that plants should be arranged in groups, or classes, founded upon certain characteristics possessed in common by each member of a group. Various modes of classifying plants have been proposed by botanists, but they may be divided into two kinds—the artificial and the natural methods. The former, as commonly used, was devised by the celebrated Linnæus, and, though now little employed as a whole, certain parts are still retained and incorporated in the natural system advocated by more modern botanists. The difference between the two methods consists principally in the number of characteristic points considered in classifying plants. In the artificial method only a few points connected with the reproductive organs were taken into account, whereas the natural method requires that the whole plant and all its organs shall be considered. To classify plants under the natural system therefore requires a thorough knowledge, not only of their reproductive organs—flowers or their substitutes—



but also of their nutritive organs, and of their general structure. As it cannot be expected that such knowledge will be possessed by the young, the following remarks are intended to convey as much information respecting the classification of plants as can be given without employing botanical terms not usually met with in ordinary books.

It must have occurred to any observant person, that there are some plants which bear no flowers, such, for example, as ferns and mushrooms, while other plants



PINE TREES.

have more or less conspicuous flowers, as, for instance, the rose or the acacia. This is a characteristic so general and so easily recognizable, that it is made the groundwork of the first or most comprehensive division of the plant-world. The whole vegetable kingdom is accordingly divided into two *sub-kingdoms*, one including all plants which bear

flowers producing seeds of some kind, the other comprising those which are flowerless and do not bring forth seeds in the proper sense of the word. Every plant, from the giant pines of California, the huge baobabs of Africa, or the monster eucalypti of Australia, down to the minute yeast plant which is undiscernible by the

naked eye, is placed in one of these divisions. There are some plants which have flowers so insignificant in appearance, that a casual observer might suppose them to be altogether wanting. In such cases minute examination is necessary to detect the existence of the flower, and to enable the botanical student to classify it aright.

Each of the sub-kingdoms is divided into *classes*, which are distinguished from each other by peculiarities in the structure, seeds, and mode of growth of the plants they severally include. It is found that a certain kind of seed is invariably accompanied by a particular structure of the plant itself, by special arrangement of the veins of the leaves, and by a certain mode of growth as the plant advances in age. To understand this fully, it is necessary to bear in mind that some seeds, when they begin to germinate, separate into two parts, as may be seen in the common pea. These parts or lobes are called cotyledons, or, more simply, seed-leaves. The seeds of flowering plants have either a single cotyledon or two cotyledons. The non-flowering plants produce not seeds but spores, which have no cotyledons. Such plants are therefore styled acotyledonous. Plants, the seeds of which possess one cotyledon, are named monocotyledons; those which have seeds with two cotyledons are called dicotyledons. As regards growth, it is necessary to state that some plants increase by additions of woody substance outside that already existing; others by additions inside; and a third kind by additions to the highest point or summit. The first of these are called exogens, the second endogens, and the third acrogens. Again, plants, like animals, are made up of tissues which are composed of cells woven together. Tissues of the same kinds are found in all plants having a similar mode of

growth. Further, leaves are veined differently in plants according as they are acotyledonous, monocotyledonous, or dicotyledonous.

Plants are divided into classes in agreement with these characteristics. The first class, for example, comprises plants with dicotyledonous seeds, exogenous stems, leaves having reticulated venation, and vascular tissue. Tissue of this kind is composed of long cylindrical cells, which contain the liquid parts of plants, and which form the vessels through which the juices are transmitted from the root to the leaves. In the second class, the seeds are monocotyledonous, the mode of growth exogenous, the venation parallel, and the tissues vascular. These two classes comprise the whole of the flowering plants. One other point of distinction between the two classes may be mentioned, especially as it relates to the flowers. The parts of flowers, called floral whorls, are arranged in twos, threes, fours, or fives; that is to say, if the outer whorl consists of two pieces, the inner whorl will also consist of two, or some multiple of two, pieces. This arrangement is termed the *symmetry* of the flower. A flower, in which the parts are arranged in twos, is said to possess the binary symmetry; one in which the parts are arranged in threes, the ternary symmetry. In the first class, the dicotyledons, the symmetry is binary, quaternary, or quinary; in the second class, monocotyledons, it is ternary. The third class, which includes all non-flowering plants, is called acotyledons, being without true seeds. Plants belonging to this class are acrogenous when they possess a stem, but some are stemless; the leaves, when present, are either without veins or have a forked venation; and the tissues are either cellular, as in the mushroom, or vascular, as in the fern.

Each of these classes is divided into *sub-classes*, distinguished by differences in the number or arrangement of the parts of the flower. The first class contains four sub-classes; the second and third two sub-classes each. The distinctions between the sub-classes are too minute to be explained without specimens, but flowers and plants may be mentioned which will illustrate them by examples. In the first class, examples of the sub-classes are the geranium, the rose, the snapdragon, and the oak; in the second class, the lily and wheat; and in the third class, ferns, mushrooms, and sea-weeds.



ROSE.



FERN.

Each sub-class includes smaller divisions called *orders*. Each order comprises all the plants possessing near resemblances in the structure of the flower, and in the arrangement of its parts. The order, for example, which is named from the rose includes, with others, such apparently dissimilar plants as the almond, apricot, apple, cherry, hawthorn, loquat, nectarine, peach, pear, plum, quince, rose, raspberry, and strawberry. However unlike these plants may appear to be, the flowers would be found, on examination, to possess so many characters in

common as to warrant their being classed together in the same order.

In each order is usually comprised several *genera*, though an order may contain but one genus. The plants belonging to a genus closely resemble each other, and agree in so many particulars that, if specimens were collected, they would at once be identified as nearly related to each other. A collection of roses, for example, would be readily accepted as related plants, notwithstanding differences in form, colour, perfume, or habit, because these are non-essential points, whereas the structure of the flower, in which they bear a close resemblance, is almost identical in each. In the same way our Australian eucalypti, although varying in the height of the stems, the colour and thickness of the bark, and the size of the leaves, are all included in the same genus, because of their resemblance in the essential matter of the structure of their flowers.

Each genus is made up of *species*. The individual plants of each species resemble each other in every particular, root, stem, bark, leaves, and flower. Although a blue gum, for example, may be older or better grown than another, yet both would be recognised without the slightest hesitation as blue gums by any person who was acquainted with the character of that plant. So with a rose, cabbage, wheat, maize, carrot, and other plants. The identification of a species is easy, except in the case of those plants which naturally, or through the effect of cultivation, sport and produce what are called *varieties*. Thus, for example, the species which was the original of the cabbage of cultivation is also the parent of the cauliflower, the brocoli, and the curled or Savoy cabbage, though at first sight these appear to differ essentially from each other.



No mention has been made of some of the sub-divisions which botanists employ to secure rigid accuracy of classification, but the foregoing remarks will give a fair idea of the principle on which they proceed, and of the results they have achieved in this direction. It should be added, however, that in the case of a few known plants it has been found impracticable to determine their classification authoritatively, their characters being so contradictory or anomalous that they cannot be placed in the order to which, at first sight, they appear to belong. In such cases the plants are classified provisionally, that is, they are placed in a certain order or genus until it has been satisfactorily ascertained, by further observation, that they are better entitled to be included in another.

The most perfect system of classification would be of comparatively little use without an exact method of naming plants. The common or trivial names of plants are not sufficiently accurate to be employed for this purpose. Very few of our indigenous flowers, for example, are correctly named in our ordinary language. The "native rose" is not a rose, and the "native fuschia" is not a fuschia. Even in the case of plants imported from the mother country, and long known there as well as in Australia, a similar confusion of names prevails. There is a well-known plant with a large white flower, which is commonly called a lily. It resembles a lily chiefly in being white, but belongs to a different order. Botanists have found, therefore, that precision of nomenclature can only be secured by using the Latin or Latinised names of plants, a plan which possesses the further recommendation of being intelligible to scientific men in all parts of the world. By this plan two names at least are required, one to denote the genus, the other for the species. The blue gum previously mentioned is

named *eucalyptus globulus*, the first name designating the genus, the second the particular species of that genus. In the same way the spotted gum, the iron bark, and the stringy bark trees, are all species of eucalyptus, which is their generic name, the specific names being *maculata*, *siderophloia*, and *amygdalina* respectively. There are many other species of eucalyptus, each distinguished by a specific name. Another genus of frequent occurrence in Australia is the *acacia*, commonly known as the wattle. One species is the *acacia pendula*, a beautiful tree, called the myall in ordinary language. Another species is the green wattle, *acacia decunias*. These examples will illustrate the method of naming plants by botanists, and it only remains to add that a third appellation is sometimes given in special cases in which there is a marked deviation from the usual character of the species. A flower may be double instead of single, or white in place of red, and a word is added to point out that circumstance.

If a traveller acquainted with this mode of classification visits a strange country, he will experience no difficulty in deciding upon the character of any new plant he may discover. From an examination of the leaf he may ascertain the class to which it belongs ; the structure of the flower and the arrangement of its parts will inform him of the sub-class and the order in which it should be included ; and a more minute inspection of the whole plant will lead him to determine its genus. Generally speaking, this knowledge will enable him to judge of its properties, whether useful or noxious. Should the plant appear to be of the *Solanum* order, he would be careful in using it, knowing that, although some of the tribe, as the potato, are among our most valuable food plants, others are deadly poisons. If, on the other hand, the

newly-found plant should prove to belong to the cruciferae, he would recognise it as wholesome, that being the general character of the order.

---

### LESSON LIV.

#### T H E L A W.

In-ju-ri-ous.  
Pol-ice.  
Com-plic-a-ted.  
Dis-ease.

Dis-o-be-di-ence.  
Ar-bi-tra-ry.  
Con-sti-tu-tion-al.  
Pre-ced-ent.

Stat-ute.  
Sep-ar-ate.  
Ful-filled.  
Con-science.

EVERY civilised nation is subject to law. Even barbarous tribes acknowledge some rule by which their actions are governed and restrained. The aboriginal Australians possessed some such rules, which they were compelled to obey. Certain kinds of food were forbidden to women and young persons. In some tribes, the law regulating marriage was of a stringent character. A law may be a positive injunction to perform some act deemed necessary for the public good. A man may, for instance, be required to pay taxes for the support of the government, or for other public purposes. Or a law may forbid the performance of an act considered injurious to an individual or to the community at large. Every man is forbidden to steal, or to assault another. The law, then, may be defined as the body of rules which all the members of the community are bound to obey. As will be seen in subsequent remarks, this definition is not strictly correct for all countries. It is, however, sufficiently near the truth for our present purpose.

The professed object of laws is, in the first place, to secure the life and property of every person in the state. If we are, by law, required to pay taxes for the support of the police, it is in order that our persons and our pro-

erty may be safe from injury from fellow-citizens. We pay taxes to support soldiers to ensure the like safety against attack from without. Further, the law provides penalties for all who injure us either in person or in property. Those of our fellow-citizens who injure our persons or deprive us of property, are punished by law in proportion to the magnitude of the offence they have committed. External enemies are punishable with death. They may be killed by any citizen without liability to punishment, should they invade our country in arms. When civilization is advanced, the object of law becomes more extensive and more complicated. For example, when by law a municipality is established in any locality, another set of considerations is taken into account. Our lives may be perfectly safe from both internal and external foes, so far as direct attack is concerned. No man may openly attempt to deprive us of our property. Nevertheless, disease bred through the neglect of others may lay hold of us, or an accident may befall us through the bad condition of roads. To prevent these evils is an object sufficiently important to warrant the imposition by law of the taxes necessary to effect it. Besides immunity from such disease and from accident, greater general healthfulness may be secured, and with it more enjoyment of life. By the operation of the same law, our property may be raised in value. Similarly when, by law, a portion of the taxes paid is devoted to the support of schools, the great object of the law is to diminish the risks to life, or depredations on our property, on the part of our fellow-citizens. By enabling them, by means of education, to know and understand the law, and to be aware of the penalties it inflicts for disobedience, it is assumed that all persons will be restrained from injuring us in any way.

Laws are made in various fashions in different countries. Among the Zulus, as among other African tribes, a law is simply the expression of the ruler's will at the moment it is made. It may be altered immediately after, if he change his mind. It is not the less binding upon the people, nor are the penalties for disobedience less severe on that account. In such cases, the proper object of law appears to us to be set aside, though those who are subject to it may view the matter differently. In more civilised despotic countries, a law may be made in an equally arbitrary manner at the will of the ruler. The Czar of Russia, for example, may issue a ukase, which must be accepted by his subjects as law. It may, nevertheless, be opposed to the interests of the people. The Sultan of Turkey is even more despotic, and is only restrained by the fear of the consequences of exciting too much discontent among his subjects. In free or constitutional countries, the laws are, in theory, made by the people themselves. As, however, this would be impossible in a large population, the duty of law-making is performed by representatives elected by the people. Usually, there are two legislative bodies, as in the more populous Australian colonies. Both such bodies must concur in passing a new law, which must also have the assent of the sovereign or principal ruler. With us, laws so made are called Acts of Parliament. These are binding upon all residents in the colony concerned. In another sense, law is made in a different fashion. There are some matters not expressly laid down in Acts of Parliament. When these come to be dealt with by a judge, his duty is to find or declare the law as already decided in previous cases of a similar kind. If there be no such cases, or precedents, he "lays down the law" upon the point at issue. In other words.



he determines what is the law, from a consideration of all the circumstances and of general principles of justice. Such a case thenceforward becomes a precedent. Law so made, including the precedents before mentioned, is known as *common law*. That which is contained in Acts of Parliament is called *statute law*.

Laws may be good, bad, or indifferent ; but all require to be well administered. A bad law may produce a minimum of evil, if skilfully administered. The operation of a good law may be rendered more beneficial by the excellence of its administration. A great English poet affirmed that "whate'er is best administered is best." Without going this length, it may be admitted that effective administration is necessary for the due observance of law. In the administration of law, three separate agencies are called into requisition. There is first the organization by which offences against the law are discovered, and the offenders prosecuted. This is to some extent the work of the police, at the outset at anyrate. Later the duty may fall to some of the higher officers of the government, and even to the Attorney-General, the highest of all. The decision as to the guilt or innocence of any offender rests, in important cases, with the jury. These are persons chosen to decide as to the facts elicited by the prosecuting officer. If the statements proved amount to a breach of a law, the jury returns a verdict of "guilty ;" otherwise, of "not guilty." The presiding judge explains to the jury the law applicable to the case ; receives their verdict ; and, when necessary, pronounces sentence. It is the function of the executive government to see that the sentence of the judge is carried out.

What is the duty of every person in relation to the law ? In an Australian colony this question is not

difficult to answer. Every one has an equal share in making the law. All are alike interested in maintaining the law and causing it to be properly fulfilled. Our first duty, then, is to know the law; the next to obey it. This implies respect and assistance to worthy officers of the law in the exercise of their functions. This again leads to the conclusion that we should induce others, by precept and example, to obey the law.

As regards knowledge of the law, it is to be remarked that the state provides instruction for all, so that none may plead ignorance. The least instructed may obtain so much education as, with the promptings of his own conscience, will enable him to avoid grave offences. Much more, however, is required, both for the sake of the individual and of the whole community. Without such knowledge he cannot rightly perform his own duty of obedience to the law. Further, he is, in that case, disqualified from judging of the suitability of a legal enactment, or of the degree in which it is worthy of observance by the community at large. Nor can he discriminate between provisions of the law which are beneficial and those which need amendment or repeal. He is also placed at a disadvantage as an elector of those representatives whose duty it is to frame laws, but who, like all other men in power, require to be watched, in order that they may be called to account when their legislation is injurious to the general weal. Moreover, ignorance of the law is not, in any country, received as a sufficient plea for breaking the law. The obvious reply to a person advancing such a plea is, "You ought to know the law; you ought to have made yourself acquainted with its provisions."

There is, in all British communities, a decided feeling in favour of obedience to the law. Criminals of all

kinds find little sympathy in such places. It is felt that respect for the law means also respect for the law-makers, the representatives of the community. Sometimes it happens, however, that a law is pronounced bad, unsuitable, oppressive. This opinion is accordingly made the pretext for disobedience. Such opposition to the law is a serious error. No law, of course, is perfect. However carefully framed, it is possible that a good law may press severely upon some individual, who, resenting the seeming unfairness, may set the law at defiance. His proper course would be to obey it, and, by calling attention to the wrong done him, and which may in time affect any other individual in the community, endeavour so to alter the general opinion as to render it favourable to the repeal of the obnoxious provisions. For it must not be forgotten that any law in actual existence expresses the will of the majority of the people by whom it was made, or who are subject to its operation. And it is a necessary condition to life in communities, that an individual member must bow to the will of the majority. If this condition be too irksome, he has the alternative of quitting the community; there is no other resource.

Respect for the law implies respect and assistance to those who are duly authorised to execute its purposes. On this head there exists some difference, even among the most loyal and true-hearted members of the community. Among the very ignorant, as among the criminal classes, defiance of the law and opposition to its officers are frequently manifested. One phase of this feeling was shown in the countenance and assistance formerly given to bushrangers. Though happily now dying out, if not already dead, this feeling was productive of much mischief. It tended to throw discredit upon law generally, and upon all concerned in its ad-

ministration. As regards the better instructed classes, the almost universal feeling is that all administrators of the law, whatever their rank or functions, ought to be aided and protected in the performance of their duties. The Australian colonies may proudly claim to rank with the first of law-abiding British communities in this respect.

Obeying the law ourselves, we should be careful to inculcate the like obedience in others. Neither our words nor our actions should tend to bring the law into disrepute. They should, on the contrary, tend to uphold and strengthen it, and place it in its true light as the will of the people, deliberately expressed by its duly authorised representatives, and sanctioned by the whole power of the state. Where, in any community, such ideas generally prevail, the laws will be found to be mild in their provisions, obeyed without effort, and maintained by their intrinsic worth, rather than by the penalties of the gaoler and the executioner.

---

### LESSON LV.

#### THE SHEEP.

Fab-ric.	Team-ster.	Fleece.
Ec-on-om-ic.	In-duce-ment.	Pas-tor-al-ists.
Ag-greg-ate.	En-cour-age-ment.	Quay.
Pe-cu-li-ar-ly.	Drought.	Trans-mis-sion.

It is not proposed in this Lesson to treat of the sheep from a natural history point of view. The nature of the sheep in health and in a state of disease is probably as well known in Australia as in any part of the world. There is certainly no other country in which so much trouble has been taken, by public legislation and by

private enterprise, to prevent the introduction and spread of disease and to improve the breed and the constitution of the sheep. As a result of this care and its consequent expenditure, we may justly point to the prices which Australian wools obtain in the markets of the world, and to the fact that, for the manufacture of certain fabrics, their quality has never been equalled.



Our design is to speak of the sheep, in the following observations, from an economic point of view, that is, as a source of national wealth. It is, of course, fully understood that the aggregate of private wealth constitutes national wealth, and that a nation, as such, is rich or poor according to the individuals composing it are rich or poor. In this sense, the sheep forms one of the



principal elements in the national wealth of Australia ; and as the soil, climate, and other conditions of the country, which so peculiarly fit it for the production of wool, are not likely to undergo any material change, it is probable that, in the future as well as in the present, the products of the sheep will continue to be among the chief sources of our prosperity. Unless circumstances, not possible now to be foreseen, should arise to lessen the demand, wool must ever form one of the staple products of Australia. Along with gold, copper, tin, and coal, wool will represent to other nations the natural wealth of the Australian colonies and its valuable merchantable commodities.

For if we reckon the number of sheep in Australia, we shall probably find it amounting to at least one hundred millions. All these have to be cared for and tended, and employment is thus found for many thousand persons. Besides shepherds, overseers, storekeepers, and others are required, and the sum to be paid as wages is therefore very great. Buildings and other erections are also needed, for which more workmen are employed, as well as men to take the sheep to market. At the annual shearing time the services of another class of labourers are called into requisition—washers, shearers, packers, and teamsters. The money required for all these purposes, added to the value of the sheep, constitutes an enormous investment, and sustains a most important national industry.

One of the chief saleable products of the sheep is its flesh. Mutton holds a conspicuous place on the list of Australian foods. Its quality is said to be inferior to that of the mother country. Whatever truth there may be in this assertion is accounted for by the fact, that hitherto more attention has been paid to the raising of

wool than to supplying the table. The market for the consumption of mutton has necessarily been limited by the comparatively small population of Australia. There was no inducement, therefore, to cultivate a breed of sheep simply for the sake of their flesh, as is done in England and other countries where the demand for food is heavy and constant. Should a demand be created, by the increase of population or other circumstances, steps would doubtless be taken speedily to furnish the requisite supply, as the country, from its vast extent and great variety of soil and climate, is capable of raising sheep of any description. An experiment has been commenced of sending meat to the English market in a frozen state, and if this should prove successful and a regular trade spring up in consequence, further encouragement would be given to sheep breeding for the sake of the flesh.

Other products of the sheep are of some value. The skins, in particular, are exported in large quantities to other countries, where they are converted into parchment and basil, the latter a kind of leather much used in book-binding, in saddlery, and in other ways. As the means of internal communication improve and the cost of carriage is reduced, larger quantities of these articles will doubtless be brought to market, either for export or for home use.

By far the most important product of the sheep, however, is wool, not only as regards the quantity and value, but also because it is yielded annually. The wool crop, to use a customary form of speech, varies both in amount and in quality, from year to year according to the nature of the season, being unusually large when the weather has been exceptionally favourable, and proportionately small after a time of drought. Quality depends very largely upon the character of the food supplied to the

sheep. In a season characterised by a sufficient rainfall food is abundant and nutritious, and the wool grows with a strong fibre, and the properties for which it is esteemed are fully developed. After a season of drought, in which the food obtainable is scanty and dry, the sheep being badly nourished is unable to produce its usual kind of wool, having in place of it a fleece comparatively thin and weak. It is therefore difficult to state the average weight of wool yielded annually by a sheep. To illustrate the vast amount of wool raised in Australia, it will suffice to assume that every sheep yields one pound weight of wool, and that the average price is but one shilling per pound. In that case the yield of wool would be 100,000,000 lbs., valued at £5,000,000.

It must not be supposed, however, that all wool is of the same quality, or brings the same price in the market. The finest obtains the highest price, and is that yielded by sheep of the most improved merino breeds. This is, under favourable circumstances, worth about four shillings per pound. On the other hand, inferior wool will be sold for a few pence per pound, especially if, as sometimes happens, it is found to be dirty, and otherwise ill-prepared for market. In fact, much depends upon the "get up" of the wool, that is, the manner in which it has been washed, pressed, packed, and otherwise cared for before it is sold. The highest qualities of wools are those grown in the districts lying along the western slopes of the Great Dividing Range of New South Wales, where the climate is not too bleak and cold. Another description of wool of the highest value in its class, though differing in character from the first mentioned, comes from the Northern Table-land. The Southern Table-land produces excellent wool of yet another kind, and further south the coarser wools are

grown in perfection. In the other colonies, similar distinctions exist in the classes of wool produced in different districts; and it will be seen that any description of wool may be grown in Australia if only pastoralists will study the specific kinds to be raised in particular localities.

The great market for wool is in the mother country, and on the Continent of Europe. To prepare it for transmission to those places large numbers of persons are engaged, and a large amount of shipping is employed. An immense amount of money is therefore invested in this business, as may be seen by any one who visits the principal Australian ports during what is called the "wool season." The streets are thronged with drays laden with wool, the wharves are covered with bales, the wool-pressers in the stores are plying their busy task, the stevedores are stowing away the freight in the holds of the vessels, and the mariners themselves seem as busy as the rest of the workers. The ships, large vessels generally of not less than a thousand tons burden, ornament the quays, and add to the significance of the scene. A good notion of the value of the wool-producing industry may be formed by supposing it to be suddenly stopped. Not only the thousands who find occupation in the interior, but also all who are concerned with wool in transmission to market would be at once thrown out of employment. Their wages would no longer give support to shopkeepers and merchants, whose business would suffer proportionately, and we should no longer be visited by such splendid ships and steamers as now trade to our ports. When their cargoes of wool ceased to fill the ships, there would be nothing to supply its place, and we should be unable to purchase goods in Europe to be brought to Australia.

## LESSON LVI.

## REFRESHING DRINKS.

De-lib-er-ate.  
Ac-cus-tomed.  
Las-si-tude.  
E-vap-or-a-tion

Ex-cess-ive.  
Per-spir-a-tion.  
Ap-pro-pri-ate.  
Bev-er-age.

Fa-tigue.  
Cau-tion.  
In-noc-u-ous.  
Chem-ic-al.

THERE are times when people feel more thirsty than usual, and when they deliberate upon the question what they shall drink with more than their accustomed interest. Sometimes this feeling of thirst is imaginary rather than real, and may, in that case, arise from a disordered stomach, or from a complaint not more formidable than having nothing to do. On the other hand, there may be real thirst, or such a sense of lassitude as makes the individual crave for a stimulant that will renovate his exhausted nerves, and brace him up for the work that lies before him, and awaits his attention. The weather may be warm, and the evaporation from the surface of the body so great as to reduce the proportion of liquid matter in the blood and tissues. This causes true thirst, and the strong desire for liquid then felt is an instinctive prompting to restore to the system that which it has lost. Violent or long-continued exertion, by promoting excessive perspiration, may produce the same effect, and give rise to the same legitimate craving. Some amount of nervous exhaustion may follow from prolonged exertion, and there will often, in such cases, be a strong desire for a stimulating, as well as a merely thirst-removing liquid. It is to such drinks that the term "refreshing" is generally applied, and very much of the habit of drinking to excess has arisen from the fact that liquors are frequently swallowed under the mistaken impression that they are really refreshing.



In a case of genuine thirst, when the system has been partially deprived of liquids, the most appropriate drink is cold or rather cool water. Absolutely cold water, when taken in any quantity, is likely to produce considerable disturbance of the system, and has been known even to produce fatal effects. But if not too cold, and taken in moderate quantity, water is the most refreshing beverage that can be chosen. Should muscular fatigue or nervous exhaustion be felt along with thirst, rest will give relief far more effectually than any stimulant. Iced water is sometimes regarded as a refreshing drink, but it cannot be indulged in with too much caution, especially by persons whose constitutions are not very strong. Taken in any quantity, it suddenly reduces the temperature of the stomach below what is necessary for the digestion of food; and the only safe way to partake of it is by sips. Aerated waters, when honestly made, are usually refreshing, though they disagree with some people. Soda water and lemonade are especially useful, the gas forced into them by the maker being grateful to the digestive organs.

In the Australian bush, tea is generally regarded as being, *par excellence*, the appropriate drink at all seasons and for all purposes. Considering the inferior quality of the water usually to be met with, it is some advantage to drink it boiled, in the shape of tea, as many impurities are thereby removed, or rendered innocuous. Still, it does not follow that tea should be drunk to so large an extent, or that it is at all times a wholesome or refreshing beverage. The strong attachment which so many people feel for tea is partly to be explained by the habit which regular tea drinking sets up in the system, and partly by the chemical properties of the herb itself. It is well known that if a person accustom himself for a

considerable period to drink at a given hour daily, even though it be but a glass of water, the habit cannot easily be broken off, for the system, as regularly as the appointed hour arrives, will crave for the liquid, and feel uneasiness until the craving is gratified. Still more difficult is it to abandon the habit when the system is accustomed to such beverages as tea, coffee, beer, wine, or spirits, for in these cases something is supplied to the system in addition to water. What that additional something is must be explained by the chemist.

The moderate use of tea produces salutary effects upon most constitutions. Cowper accurately described its action upon the mind when he called it "the cup that cheers but not inebriates;" for it raises the spirits without causing intoxication. It stimulates the brain when flagging, and thus induces wakefulness, for which reason it is valued by students and other brain-workers. Upon some parts of the system tea exerts a soothing effect, and is often useful in removing headaches. But its most general use is to diminish the natural waste of the system, and lessen the amount of food necessary to replace the matter which is removed from the body by the exercise of its ordinary functions. Together with its slightly exhilarating qualities, it has the substantial property of enabling the tea-drinker to live upon a smaller amount of food than would otherwise be required. Taken in excess, however, either as regards quantity or strength, tea powerfully affects the nerves, accelerates the pulse, causes tremblings, and finally induces a peculiar kind of intoxication. It also acts upon the digestive organs, producing constipation and other irregularities. Tea derives its beneficial, as well as its injurious powers, from its chemical composition. Three of its known ingredients are of an active nature. There

is, first, a volatile oil, which imparts to the tea leaves their well-known scent and flavour, and which is believed to be a powerful narcotic. The next is a peculiar substance named theine, which, when extracted, takes the form of small crystals. Theine is contained, not only in



TEA PLANT.



COFFEE PLANT.

tea, but also in coffee, in maté—a species of holly used in Paraguay for the same purpose as tea—and in some other plants which take the place of tea. It is the most powerful ingredient in tea, producing, when taken in minute quantities, the beneficial effects before described, but, when used to a large extent, injurious consequences. The third ingredient, *tannin*, or *tannic acid*, is an astringent substance found in the bark of various trees, such as the Australian acacia, used for tanning leather. Beyond its constipating effect, the action of the tannin in tea upon the human body is not well understood. The lesson we are to derive from the knowledge of these facts is the necessity of moderation in the use of tea.

Coffee, though used in Australia to a far less extent than tea, furnishes a refreshing drink which, in the opinion of its advocates, is at least equal to the more popular beverage. Its effects upon the system are similar to those produced by tea. In the words of a popular writer, "It exhilarates, arouses, and keeps awake; it counteracts the stupor occasioned by fatigue, by disease, or by opium; it allays hunger to a certain extent, gives to the wearied increased strength and vigour, and imparts a feeling of comfort and repose. Its physiological effects upon the system, so far as they have been investigated, appear to be that, while it makes the brain more active, it soothes the body generally, makes the change and waste of matter slower, and the demand for food in consequence less. All these effects it owes to the conjoined action of three ingredients very similar to those contained in tea. These are a volatile oil produced during the roasting, a variety of tannic acid which is altered during the roasting, and the substance called theine or caffeine, which is common to both coffee and tea." It may be added that coffee possesses some medicinal virtues not to be found in tea.

That beer, wines, and spirits often form refreshing drinks is not to be denied, though, on the other hand, it must be confessed that they sometimes produce intoxication, and are continually liable to abuse. They owe this intoxicating property to alcohol, which is present in each, but in varying degrees of concentration, spirits containing the greatest and beer the least proportion of that ingredient. The effects of alcohol upon the bodily frame have been described in a previous Lesson, and it is only necessary to recur to the subject here in order to point out the danger of having habitual recourse to alcoholic drinks, under the idea that they are refreshing.

This term can only be applied to them when they are used in very small quantities. Even in what is generally termed a "moderate" quantity there is little power to refresh either body or mind, while there certainly is great danger that both will be unduly excited, and in the end stupefied. Physiologists and medical men are not entirely agreed on the question as to the effects of moderate indulgence in fermented or spirituous liquors, but on one point there cannot be the least shadow of doubt—that they are unnecessary, unwholesome, and actively injurious in the case of the young.

Whenever, therefore, we are tempted by the languor induced by hot weather or fatigue to seek for a refreshing drink, we should remember that the simplest is the best, pure water taking the first rank. Other non-intoxicating beverages follow; and recourse should be had to alcoholic preparations only in extreme cases.

---

## LESSON LVII.

### JAMES ABRAM GARFIELD.—PART I.

Ad-verse.	Cap-ri-cious.	De-pend-ent.
In-dom-it-a-ble.	Se-lect-ors.	La-bo-ri-ous.
Per-sæ-ver-ance.	Stren-u-ous-ly.	Sac-ri-fice.
Traits.	Be-reaved.	Un-con-sci-ous-ly.

THERE is probably no other biography extant that presents to young Australians so many striking lessons, or such a worthy example, as that of James Abram Garfield, formerly President of the United States of America. Other men have struggled in poverty as bitter, against circumstances as adverse, and by indomitable courage and perseverance have raised themselves to fame and fortune; but it may be questioned whether any have



exhibited so consistent a nobility of aim, or pursued the object in view with such undeviating rectitude. Whether as regards the sterner virtues which form the essentials of manly life, or the softer traits of character which adorn it, Garfield's history is replete with lessons which, owing to his peculiar circumstances, are specially interesting and profitable to the youth of Australia.

James Abram Garfield was born on the 19th of November 1831, at Orange, then a small settlement in the state of Ohio. His father, a man of large frame and capacious mind, was a farmer of the pioneer class. His mother, a bright, intelligent woman, possessed a character well adapted to influence her children for good, and she proved herself capable of such sacrifices for their sakes as are made only by the best of mothers. The little dwelling which was Garfield's birthplace was built of logs, and roofed with slabs, held in their place by long poles. The interstices between the logs were filled with clay, and the chimney was constructed of similar materials. The furniture was equally rude. In all essentials, the home of the Garfields resembled thousands of humble dwellings still to be found in Australia. Substitute slabs for the walls and bark for the roof, and the principal differences are removed. Part of the little farm was cultivated, and the crop of wheat supplied the chief portion of food for the consumption of the family. Compelled to labour industriously and constantly, and provided with food in scant measure and of coarse quality, the lot of the Garfields possessed few attractions, and may be compared to that of the poorest of "free selectors" in the Australian colonies.

Hard as was their lot during the lifetime of the elder Garfield, it became still more bitter after his death, which happened when James was a mere infant. A

bush fire had sprung up, and for some hours Garfield, his wife, and all the children except the baby, toiled strenuously to keep it back from the wheat field and the homestead. Their exertions were successful, and the sheltering roof and winter's meal were both saved, though at the cost of the father's life. Garfield imprudently sat down upon a stump to cool himself after his labour, which had thoroughly heated his bodily frame; the cold wind produced a chill, which resulted in congestion of the throat; and the absence of proper medical aid, and consequent mistakes in the treatment of the complaint, finally caused his death. It is easy for an Australian to form a mental picture of that bush funeral—the rough box in which the dead man was enclosed, the mourning wife and children, and the sympathising neighbours; and also the absence of all ceremony, and even of a clergyman. The remains were interred in a corner of the wheat field. After the funeral, the bereaved widow and her children returned to their cabin, and prepared to fight the battle of life without the aid of the husband and father, whose strong arm and indomitable spirit had hitherto been their sole earthly reliance.

Winter came with its storms and snows, and wolves howling around the dwelling. The inmates were reminded of their loss by the very audacity of the wild beasts which, if a man had been living in the cabin, would not have ventured so near. That sad winter passed, and with returning spring came the necessity for the widow to decide as to her future course. Her stock of food was almost exhausted, she had no money to purchase more, and the farm itself was not wholly paid for. In her distress she appealed for advice to a neighbour and relative, one of the few heads of families residing

within ten miles. This worthy man suggested the sale of the farm and the removal of the family to the vicinity of the place dwelt in by Mrs. Garfield's relatives, who, it was thought, would lend her a helping hand. The brave woman felt, however, that she could not leave her husband's grave, or abandon the cabin which was the only shelter for her children; and she emphatically rejected the notion of being dependent upon the bounty of her friends. In the end, she resolved to sell a portion of the farm, and to remain and cultivate the remainder, with the assistance of her eldest son Thomas, a boy not then eleven years of age. Carrying out this plan, she paid her debts; and Thomas, with the help of his sister, aged twelve, prepared the ground for crops of wheat, maize, potatoes, and vegetables. Mrs. Garfield took a full share of the work of the farm, and occupied her time chiefly in splitting rails for fencing, an employment not less laborious and exhausting in America than in Australia.

In due time, the farm was fenced and planted, and prosperous times appeared to be approaching. On looking over her supply of corn, however, Mrs. Garfield discovered that, on the most exact calculation she was capable of making, there was not sufficient to last until harvest, and she therefore resolved to forego a meal a day until the crops were gathered in. Subsequently she discovered that she had made a mistake in her calculations, and that the food on hand would be all consumed in a shorter time than she had reckoned upon, and this heroic mother at once determined to abstain from a second meal daily, in order that her children might not want. For some months she lived upon one meal a day, notwithstanding that she continued to labour to the fullest extent that her strength permitted. Fortunately

for her and her family, the harvest proved to be an unusually abundant one, and they were never again in danger of starvation. Although the children were not aware of their mother's sacrifice on their behalf, it cannot be doubted that her devotedness and self-reliance made themselves felt in the little household, and unconsciously moulded the characters of its younger members.

Reared in such an atmosphere, where the discipline of poverty was sweetened by family affection, James Garfield had nearly reached his fourth year when two events occurred which mark an era in his life—for the first time he wore a pair of shoes, and he went to school. His shoes were a gift from his brother Thomas, who, in addition to his labours on the farm, contrived to gain a little money by working for a neighbour, and the noble fellow paid the shoemaker out of his earnings. The school was to be a mile and a half distant from his home; and like thousands of Australian children, little James would have to trudge through the bush, morning and evening, in all weathers. His sister, however, saved him from much weary plodding, for the brave and affectionate girl was accustomed to carry him on her back to and from the school. James was an intelligent child, and of so sweet a disposition that he was liked by all, and idolised by his own family. Even at this early age he gave indications of great mental activity, and his progress in learning would have been considered remarkable even in a far more pretentious educational establishment. At that time, schools in the backwoods of America, like those in the Australian bush, were of a very poor description, scantily furnished with necessary appliances, and, in the former country, kept in operation for a portion of the year only, and that generally the

winter. As little Garfield could not walk to the school in that season, and his sister would be unable to carry him, his first term of attendance was but brief, although it roused and awakened his mind in a wonderful manner.

Some little time after, a log schoolhouse was erected by the neighbours upon a piece of land given by Mrs. Garfield out of her farm, and James was thus enabled to attend school with greater regularity. He continued to make rapid progress, and became extremely fond of learning, as he evinced by his diligent perusal of every volume that came in his way. Every spare moment was devoted to study; and when not under instruction by his teacher he would apply for help to his mother. Her lessons were chiefly intended to cultivate the moral sense, and to inculcate such virtues as temperance, truthfulness, self-dependence, moral courage, and loyalty to his country. Yet, at the same time, he assisted with the work of the farm, chopped wood, milked cows, husked corn, and grew vegetables for the family. By the time he was eight years of age he was able materially to relieve his brother Thomas, who, in turn, employed the time thus set free from farm labour in working for the neighbours, and whose earnings were of substantial use in supporting the family.

When James attained his twelfth year Thomas became of age, and removed to another state, Michigan, where he had entered into an engagement to clear some land for a new settler. James was accordingly placed in charge of the farm, working hard and cheerfully from morning till night, pleased with his toil and his responsibility, and striving for success with all his might. At the same time he neglected no opportunity of continuing his education, and found food for his mind in striving fully to understand the operations of the farm. In short,



he was resolved to draw instruction from everything that came under his notice, and thus the woods and fields, the seasons, the whole face of nature, became his teachers, filling his spirit as well as his mind with lessons that developed their powers, and strengthened him to make further acquisitions from the realms of thought.

A subject of frequent discussion between his mother and himself about this time, was how he might obtain a complete education ; and the idea that he would like to become an educated man took hold of his mind by degrees, and ultimately became the ruling motive of his life. The manner in which this object could be accomplished was not, however, made clear for several years after, though steadfastly kept in view by Garfield and his mother. The return of his brother Thomas from Michigan, bringing with him seventy-five dollars, the sum earned during his absence, was the occasion for further instruction to James. This money was to be devoted to the erection of a weatherboard house for his mother, the timber having been prepared by Thomas long before, but the means to pay a carpenter being wanted. James was delighted at the prospect, both because his mother would have a more suitable home, and because of the opportunity he would have of working upon a building. Accordingly we find him actively assisting the carpenter ; mortising, planing, hammering nails, and making himself generally useful, often as an errand-boy to the other workmen, and always with goodwill. He succeeded beyond expectation ; and although he failed in his first attempt to drive a nail, the mistake afforded him a lesson by which he was quick to profit. Every moment he could spare from farm work was spent at the building, and the experience he gained in carpentering was destined to prove of signal advantage to him,

both at that time and many years after. The new house being finished, the family moved into it, and Thomas returned to Michigan, to earn more money by the laborious employment of clearing.

James had seen how much could be accomplished by means of money, and, ambitious to help his mother in the same way as Thomas had already done, he proposed to her that he should try to obtain occasional employment as a carpenter. Mrs. Garfield, while impressing upon him the importance of adopting some higher aim, nevertheless consented, and James readily found the engagement he sought. As the result of his first day's work, he brought home the sum of one dollar, which he presented to his mother with a heart glowing with pride and affection. What the strength of these feelings was in him may be inferred from the fact that he was too poor to wear boots, except in winter. Another term of attendance at school followed, during which he was present every day, and he then engaged with the carpenter upon daily wages. His first work was to assist in building a barn, and for this he received twenty dollars. The money, however, was not the only benefit he derived from this employment, for, with his usual determination to do everything well that he undertook, he spared no pains to understand fully all the operations in which he took part, and to gain a complete acquaintance with the whole plan of procedure. In this spirit he drew a plan of a barn and studied it assiduously, so that he might learn the art of constructing such edifices. It must not be supposed, however, that his hard honest work disinclined him to continue his education. He still kept up his habit of reading in the evening and during leisure hours. It is recorded that, having in some way gained possession of *Robinson Crusoe*, he was so fascinated by

the book that he read it repeatedly, and perfectly mastered its contents. Other books less congenial, it might be deemed, to the mind of a boy in the backwoods, were read with equal avidity, and he also showed that he possessed a very good knowledge of arithmetic and geography.

His heart was not less cultivated than his intellect. His affection for his mother grew with his growth, and manifested itself in willing obedience to her wishes, in endeavours to add to her comfort, and still more in refraining from actions of which he knew she would not approve. Strenuously as he toiled, he was a merry and gentle companion among boys, and notwithstanding his great strength, never overbearing or disposed to act the bully towards others. On the contrary, he loved to protect the weak and helpless among his fellow-pupils at school, and was always angered by any display of cruelty to the lower animals. As might be expected from such a character, he bore teasing with good-humoured equanimity, and speedily became popular, not only with his school-fellows, but also with the persons with whom he was associated in his work. More farming and carpentering occupied his time until he was fourteen years of age, when he was described as a big strong boy, giving promise that in due time he would become an unusually powerful man.



## LESSON LVIII. 58

## THE JUDGMENT OF SANCHO.

Per-ceiv-ing	Ad-vers-ar-y.	Spec-ta-tors.
Be-seech.	O-beis-ance.	Con-ject-ure.
Plaint-iff.	Pa-tience.	Dunce.
Cred-it-or.	Stom-ach.	Reed.

[Sancho Panza, an illiterate Spanish peasant, who had been chosen as a squire or attendant by the demented knight, Don Quixote, during his wanderings in quest of adventure, supposed himself to have been appointed by his master's friends to be governor of an island, and in the performance of his duties took his place on the judgment seat to try any charges that might be brought under his notice, his patrons meanwhile looking on, in the hope of extracting some amusement from the proceedings. In the case following, however, Sancho displayed an amount of shrewdness that must have astonished the spectators, who expected only to laugh at his blunders.]

AFTER the governor's order was executed, two old men appeared before him, one of them with a large cane in his hand, which he used as a staff. "My lord," said the other, who had none, "some time ago I lent this man ten gold crowns to do him a kindness, which money he was to repay me on demand. I did not ask him for it again for a good while, lest it should prove a greater inconvenience to him to repay me than that he laboured under when he borrowed it. However, perceiving that he took no care to pay me, I have asked him for my due; nay, I have been forced to dun him hard for it. But still, he not only refused to pay me again, but denied he owed me anything; and said, 'that, if I lent him so much money, he certainly returned it.' Now, because I have no witnesses of the loan, nor of the pretended payment, I beseech your lordship to put him to his oath; and, if he swear he has paid me, I will freely forgive him before all the world."

"What say you to this, old gentleman with the staff?" asked Sancho.

"Sir," answered the old man, "I own he lent me the

gold; and, since he requires my oath, I beg you will be pleased to hold down your rod of justice, that I may swear upon it how I have honestly and truly returned him his money."

Thereupon the governor held down his rod; and, in the meanwhile, the defendant gave his cane to the plaintiff to hold, as if it hindered him, while he was to make a cross and swear over the judge's rod. This done, he declared that it was true the other had lent him ten crowns, but that he had really returned the same sum into his own hands; and that, because he supposed the plaintiff had forgotten it, he was continually asking him for it. The great governor, hearing this, asked the creditor what he had to reply. He made answer that, since his adversary had sworn it, he was satisfied, for he believed him to be a better Christian than offer to forswear himself, and that perhaps he had forgotten he had been repaid. Then the defendant took his cane again, and, having made a low obeisance to the judge, was immediately leaving the court. When Sancho perceived this, reflecting on the passage of the cane, and admiring the creditor's patience, after he had studied awhile with his head leaning over his stomach, and his forefinger on his nose, on a sudden he ordered the old man with the staff to be called back.

When he was returned, "Honest man," said Sancho, "let me see that cane a little. I have a use for it."

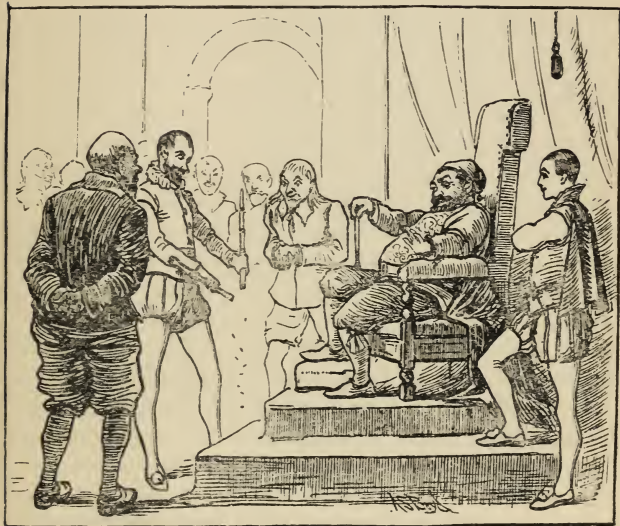
"With all my heart," answered the other. "Sir, here it is;" and with that he gave it him.

Sancho took it, and, giving it to the other man: "There," said he, "go your ways, and heaven be with you, for now you are paid."

"How so, my lord?" cried the old man; "do you judge this cane to be worth ten golden crowns?"



"Certainly," said the governor, "or else I am the greatest dunce in the world. And now you shall see whether I have not a headpiece fit to govern a whole kingdom upon a shift." This said, he ordered the cane to be broken in open court, which was no sooner done than out dropped the ten crowns.



All the spectators were amazed, and began to look on their governor as a second Solomon. They asked him how he could conjecture that the ten crowns were in the cane. He told them that, having observed how the defendant gave it to the plaintiff to hold while he took his oath, and then swore that he had truly returned the money into his own hands, after which he took his cane again from the plaintiff, it came into his head that the money was lodged within the reed.

## LESSON LIX.

## CLASSIFICATION OF ANIMALS.

Par-a-gon.	Dis-tin-guished.	Re-sem-blance.
Sys-tem-at-ic.	Con-spic-u-ous-ly.	Car-ni-vor-ous.
Ver-te-bra-ta.	Er-ro-ne-ous-ly.	Char-ac-ter-is-tics.
Am-phi-bi-an.	Ap-prox-im-ate.	Typ-ic-al.

IN striving to acquire a knowledge of the animal kingdom, the student finds himself confronted with a vast number of living creatures, differing from each other in size and in organization. From the enormous whale, measuring a hundred feet in length, to the minute acarus, discernible only by the aid of a microscope, is an interval to be filled in by animals whose dimensions vary in a thousand different gradations. Not less wide is the distance between man, the paragon of animals, with his complex structure and highly-developed nervous system, and the *amæba*, an animalcule resembling a lump of jelly, and apparently destitute of organs. To become acquainted with all these, even in a superficial manner, would obviously be beyond the power of a single individual, unless aided by the labours of other students. The observations and reasonings of naturalists, recorded in a systematic form, become a valuable help, but only when the animals described have been classified with more or less exactness. In the animal kingdom, therefore, as well as in the vegetable, some system of classification is required.

Naturalists, however, are not yet agreed as to the proper basis of classification. All concur in the view that animals should be classed in accordance with their structure, but their opinions diverge when they come to enumerate the points of structure which are to be taken into account. No one system of classification is conse-

quently accepted universally at the present time. That devised by Cuvier, the French naturalist, is perhaps more generally employed than any other, and may still be regarded as the model upon which different systems have been framed. It will be convenient to retain, for the present, the old division of the animal kingdom into vertebrate and invertebrate animals, that is, those which are provided with backbones, and those which are destitute of such parts. These are called *divisions*, though some modern naturalists term the vertebrata a sub-kingdom, and divide the invertebrata into several such sub-kingdoms.

Vertebrated animals are now usually divided into five great *classes* — fishes, amphibians, reptiles, birds, and mammals. All these may be easily recognised, with the exception of the second, which includes animals formerly regarded as reptiles, though differing from them by the possession, at some period of their lives, of breathing gills instead of lungs. These gills fitted amphibious animals for breathing the air contained in water, as in the case of the tadpole, which is the partially developed young of the frog. The term amphibian is derived from two Greek words, implying two, or both, lives—one in water, and one on land.

Fishes are easily distinguished from animals belonging to other classes by their shape and general structure, but especially by the possession of gills instead of lungs. Their blood is renovated by the oxygen contained in the air, which is mixed up in the water coming into contact with the gills. In this respect they differ conspicuously from some of the mammals which inhabit the water, such as whales and porpoises, which, even at the present day, are commonly but erroneously spoken of as fishes. On the other hand, sharks and some kindred fish have, by

some naturalists, been separated into a distinct class, supposed to approximate more closely to the amphibians.

Among the amphibians, the most commonly known are the frog and the toad. The Australian tree frogs are familiar examples: their toes are furnished with suckers, by means of which they climb with great ease. Besides these, there are other amphibians of a curious description. Such, for example, is the eel-like proteus, found in the waters of certain caves in Illyria and Dalmatia. It is about a foot in length, of a very pale flesh colour, and with scarlet gills on each side of its neck. Its limbs are weak, and its rudimentary eyes are covered with skin. Living in total darkness, organs of vision are unnecessary.

The class of reptiles is well represented in Australia by the *turtles* found upon the coast, by the *snakes* and *lizards* inhabiting the land, and by the *crocodiles* which frequent the streams in the hotter portions of the continent. In the turtle, the vertebræ and ribs are flattened out into broad plates, which form a strong shield called the "carapace," and which, in conjunction with a similar plate beneath the body, encloses the animal's body and limbs as if in a case. Snakes are too familiar to young Australians to require special notice in this place, and lizards are common enough and harmless, except, perhaps, to eggs and chickens. There is, however, a lizard which, from the absence of limbs, and great resemblance to a snake, is often mistaken for the latter, although a harmless creature of the former order. It is more properly known as a blindworm.

Passing over the birds, we come to the mammals, or animals which suckle their young. These will enable us to illustrate most completely the general classification of animals. As a general rule, the mammals are divided



into *orders*, in accordance with the number, position, and structure of their teeth. One of the most distinct of these orders is the *carnivora*, which includes animals that, as a rule, live upon flesh, and devour other animals. They possess the usual kinds of teeth known as incisors, canines, and molars, the last being better adapted for cutting than for grinding; and the second, from their size and shape, fitted for tearing or rending flesh. The



tiger is, perhaps, the typical example of this order. The whole order is divided into *sub-orders*, according to the mode of progression of the several members, whether by means of broad-webbed paddles, as in the seal; by walking upon the sole of the foot, as in the bear; or by walking upon the toes, as in the lion. In the first sub-order are included seals and walruses; in the second, bears, badgers, and some smaller animals; and in the third,



weasels, civets, hyænas, dogs, and cats. All the animals mentioned differ considerably from each other in external appearance, though, on examination, their teeth would be found to exhibit the same general characteristics. Thus each sub-order is divided into *families*, the members of which resemble each other in the structure of their teeth, as well as in other particulars. For example, we speak of the weasel family or tribe, the dog family, or the cat family, all belonging to the Digitigrade sub-order. A family is named from some animal supposed to be of a typical family.

A family may include one or more *genera*. The cat family, for instance, comprises but one *genus*, which is named *Felis*, that word being Latin for cat, the family itself is called *Felidæ*. The *Canidæ*, or dog tribe, number two genera, dogs and foxes, which resemble each other so closely in all essential particulars that some writers are disposed to comprehend both in one genus.

Genera are made up of *species*. It is difficult to define a species in such terms as shall be free from objection in some form without using scientific words which themselves require long definitions or explanations. A species may, however, be said to be a group of individuals which resemble each other in all their essential characters. It is easier to explain what is meant by a species through examples than by definition. Every one recognises that a dog is a dog, although great differences exist in the form, size, and colour of the varieties of that animal, for these are not essential characters. Different species of the same genus are distinguished by the addition of a word to the generic name. Thus *Felis* being the name for the whole genus, the true cat is styled *Felis catus*, the lion, *Felis leo*, and the tiger *Felis tigris*. In these cases, the words *catus*, *leo*, and *tigris*, are specific names.

One of the orders of mammals contains but one family, genus, or species. This is the order *Bimana*, the two-handed, which includes only man. It is perhaps desirable to point out that, in a natural history sense, man is an animal, though, in ordinary speech, it is common enough to observe a distinction drawn between man and animals, instead of between man and the lower animals. Even as an animal man stands alone, and superior to all others; he is a rational animal, they are brutes or irrational animals. The varieties of mankind are very great, yet all are immediately recognised as men. Europeans, Australian aborigines, Chinese, Fijians, Hindoos, Malays, and Negroes may all be seen in our seaport towns; they differ in height, in build, in the form of the countenance, and especially in colour; and yet all are acknowledged to be men. Height, build, and colour are accidental and not essential characters; and though, in the old days of negro slavery, attempts were sometimes made to prove that the black was not a man but an inferior creature, the universal belief now is that all men are individuals of one species.

The order marsupialia, which, with a few exceptions, is peculiar to Australia and its adjacent islands, is deserving of special mention. All the members of this order possess, in either a rudimentary or a fully developed state, pouches in which to carry their immature young. In some species, only the marsupial bones are present, that is, special bones which would support the pouch had it existed; while in others, as the kangaroos, the pouch is complete and perfect. Marsupials are now generally arranged in groups from the nature of their food, though there are corresponding differences in their dentition. The first of these is called by a name signifying *root-eaters*, and it includes but one species, the well-known

wombat. The *grass-eaters* comprise the kangaroos and kangaroo rats, which need no lengthened description. It should be mentioned, however, that in New Guinea are kangaroos which live in trees. Under the designation of *fruit* or *seed-eaters* come the koala and the phalangers, the so-called "native bear," and the "opossum" of the colonists. Both these names are erroneous. The native bear has no relation to the true bears, and the real opossums are found exclusively in America, being the only marsupial animals found in that continent. The flying phalangers, sometimes called squirrels, have prehensile tails, and a fold of skin along each side of the body, connecting the fore and hind limbs. By means of this skin they are able to take flying leaps from tree to tree, but they cannot fly in the ordinary sense of the word. The *insect-eaters* include the bandicoots, the chaeropus, and the banded ant-eater, which not only devour insects, but also prey upon small invertebrate animals. Some of the marsupials are truly carnivorous. These belong to the group of *flesh-eaters*, which includes the dasyures and the thylacinus, popularly called in Tasmania the "tiger" or "hyæna." The arsinine dasyure is also a native of that island, and is extremely ferocious. In Australia the smaller dasyures are called "native cats;" they are dangerous to poultry and small animals, but do not possess the same power of destruction as their Tasmanian relations. The divisions now described are very useful, and mark actual differences between the animals comprised in the different groups, though it may be questioned whether the titles given them accurately denote their several characters.



## LESSON LX.

## JAMES ABRAM GARFIELD.—PART II.

Vague.	Dis-rep-u-ta-ble.	En-deav-oured.
Be-lief.	Con-tam-in-a-tion.	Temp-or-ar-y.
Re-mu-ner-a-tive.	Buc-can-eer.	En-gage-ment.
San-guine.	Per-ni-cious.	A-gue.

WHEN young Garfield was fifteen years old, the vague aspirations as to his future, which had formerly occupied his thoughts, began to take a more definite shape, and to exert a more evident influence upon his life. A feeling of dissatisfaction with his surroundings, and a desire to see more of the wide world, respecting which his geography had told him so much, sprang up in his mind, and induced him to wish for the opportunity for entering

upon a higher career than any that had hitherto offered for his choice. While this feeling was doubtless inspired partly by his belief in his own capabilities, it seems equally certain that a not less effective motive was his love and reverence for his mother, and his strong desire to assist her when he could obtain constant and more remunerative employment. At the same time, he manifested a dutiful disinclination to take any step in that direction without her sanction or concurrence. It was after a full discussion between them, in which dangers and difficulties were pointed out by the anxious mother, and disposed of in his sanguine fashion by the son, that an agreement was finally arrived at that James should engage himself to a "black-salter" at a salary of fourteen dollars a month. The business of a black-salter was the extraction of potash from wood-ashes, which were obtained from the timber consumed in "burning-off" during the process of clearing land. The work was dirty, and the class of men generally employed rough and disreputable. They seem to have borne the character of being addicted to the use of foul and profane language, and one of Mrs. Garfield's chief anxieties on behalf of her son was on this very account. The event proved that he possessed sound principle, and strength of mind enough to resist contamination, while his honesty, attention to business, and zeal for his master's interests, rendered him generally esteemed. While in this situation, certain books belonging to his master's daughter fell into Garfield's hands, and the perusal of these volumes exercised a powerful and not wholly beneficial influence upon his subsequent history. They were, for the most part, novels relating to the sea, but some were histories of pirates, buccaneers, and other criminals—reading of a most pernicious kind for any boy, but especially dan-



gerous in the case of young Garfield, on account of his limited acquaintance with books and the unbounded confidence he had hitherto reposed in all that he had read. These books implanted in his breast an eager craving for a sea life ; to be a sailor, to command a ship, and to distinguish himself as a captain, became the sole objects of his ambition. While brooding over this idea, a remark made by his master's daughter caused him to take offence, and he immediately left his employment and returned to his home. Handing his mother fifty-six dollars he had earned, he announced his intention to remain at home, and "try to be somebody."

As he would never attempt to carry out his idea of going to sea without his mother's consent, it was necessary to inform her of his wish. Mrs. Garfield earnestly deprecated the thought in his case, for her fondest wish was that he might become distinguished as a teacher, or as a clergyman, and she endeavoured to reason with him as to the unwisdom of the course he desired to pursue. She was too wise, as well as too loving, to try his temper by a positive command to abandon the notion ; and as James assured her that he did not wish to go to sea against her will, the subject was allowed to drop for the moment. He obtained temporary employment, first as a woodchopper, and afterwards in harvesting, earning in both capacities as high wages as a man, and exhibiting great strength and power of endurance. Returning home, after the conclusion of his engagement, he again attended school during the winter, looked after the farm, and occasionally worked for persons in the neighbourhood. But he was restless ; he no longer worked with the vigour he had formerly displayed ; and Mrs. Garfield, seeing with a mother's eyes, feared that he was haunted by his old passion for the sea. At last, unable

longer to repress his feelings, he reopened the subject to his mother, and after much consideration a compromise was arrived at. It was mutually agreed that James should, as a first step, make a trip in one of the vessels sailing on Lake Erie, any further proceeding to depend upon the result of this experiment. Fortunately, the captain to whom James applied, not only refused to take him, but behaved in such a ruffianly manner, that the attempt was abandoned. Instead of returning home, or informing his mother of the result, James engaged as mule-driver to a canal boat at twelve dollars a month. In this humble employment, among men who were as intemperate, profane, and quarrelsome as his former associates in the black-salting business, he remained for some time, securing, however, in the course of his engagement a somewhat more responsible position and higher pay. His old reputation for faithful work was fully maintained, and he also became favourably known as a peacemaker, notwithstanding his acknowledged courage and strength. So far from allowing himself to be contaminated by the prevailing intemperance and profanity, he reproved both, and endeavoured to lead his companions to relinquish the habit of drinking to excess, and using improper language. His efforts for their reformation in these respects were well received; and though his stay on the canal boat was too brief to admit of permanent success, he doubtless accomplished some good. Several accidents befell him in this situation, and in one instance, which powerfully affected his mind, he was, as he believed, miraculously saved from drowning. An attack of ague which followed shortly after incapacitated him for work, and he accordingly set out for home, which he reached with difficulty. Here, while nursed by his mother into convalescence, he had time and opportunity for reflec-

tion, the result of which was of the highest consequence to his future life.

Aided by his mother's suggestions and the counsel of a young man a few years older than himself, Garfield finally decided "to get an education." Accordingly it was arranged that he should enter as a pupil at a seminary at a place called Chester, and that he should be accompanied by two of his cousins. Their appearance as they travelled on foot to Chester would, to our notions, have appeared altogether inconsistent with the dignity of such an institution. They carried on their backs their cooking utensils, and all the various articles, including some provisions necessary for a party of persons intending to board themselves. The three boys were clad in a style that corresponded rather with their humble means than with the pretensions of a seminary, but fortunately no false pride prevented them from prosecuting their intention to secure a superior education. Many others among the pupils were in the same position, though probably none came with greater poverty or stronger resolution to the work. Having hired a room, the three boys took possession, unpacked their utensils, and cooked their first meal. James commenced with eleven dollars in his purse, but his expenses, including the purchase of books, speedily reduced this sum, and pointedly suggested the necessity for obtaining more. He therefore called upon a carpenter in the town, and arranged with him to work before and after school, and on Saturdays at a fair wage, for James was too independent to receive from any man, however benevolent, money that he had not honestly earned. Though by this arrangement James was able to keep himself in food, he was nevertheless obliged to sacrifice some of the time he wished to devote to study, and to forego all games and amusements, of which he

was as fond as other young people. He felt, however, that every other consideration must give way to his primary object—that of obtaining a good education; and for this object he made yet greater sacrifices. He attended school, studied by himself, read books from the school library, wrote essays, joined the debating society, and at the same time strove to reduce the cost of living to the lowest possible figure. So passed his first term at the seminary. He had made great progress, had obtained the applause of his classmates and the approval of his teacher, and carried home with him a few dollars which were left over and above his expenses at school. His vacation was to last two months, which he did not propose to spend idly. He first assisted his brother Thomas to erect a weatherboard barn for his mother, and when that was completed, he hired with neighbouring farmers, and was enabled, from the money so earned, to discharge the debts incurred during his illness, and to provide himself with some necessaries for the next term at school. His evenings were spent in reading and study.

At the close of the vacation James returned, poorer than ever as regards money, to the seminary, resuming his studies with his accustomed energy and perseverance, and maintaining himself by carpenter's work after and before school hours. While he was in his own person an example of all that was right in a schoolboy, he had sufficient moral courage to speak in condemnatory terms of the conduct of such of his fellows as were disposed to behave improperly. On one occasion when a boy had misconducted himself out of school, and was threatened with expulsion, some of his companions expressed sympathy with him, and intimated their intention of quitting the seminary if that punishment were inflicted. Garfield, on being appealed to by them, unhesitatingly

declared his opinion that the boy was wrong and the teacher right, and expostulated with those who wished to uphold the wrong-doer at the expense of propriety and justice. The result was that their mistaken sympathy was withdrawn, the offender apologised and was forgiven, and the discipline of the school was preserved. All notion of going to sea had now been apparently removed from Garfield's mind, and in its place he had taken up the notion of becoming a teacher during the winter months, the only period when bush schools were open in that part of America. In this design he was encouraged by his teacher, who by this time had become acquainted with the qualities of the lad's mind and character, and considered him capable of filling such a position with success. On his return home and consultation with his mother, without whose advice he seldom took any important step, he set out in search of a vacancy as school teacher. After numerous disappointments and some rebuffs occasioned by his youth and inexperience, he relinquished the task over which he had spent two days with no useful result. Finally, however, an appointment to a school in the neighbourhood was offered to him, and after consideration accepted, although the pupils bore the character of being both idle and refractory. So judicious was his management, however, that his success was speedily assured; and school-keeping was forthwith added to the list of his accomplishments, and became his customary occupation at such times as the seminary did not require his attendance. Three years were thus passed, and during the third term an acquaintance suggested to him that he should endeavour to graduate at some college that was entitled to confer academical degrees. The only obstacle to such a course was his poverty. He possessed sufficient resolu-



tion to persevere during the six or seven years of preparation and study necessary to obtain a degree, and he had already given evidence of his intellectual ability; and there remained only the problem of the means of living. Having ascertained, however, that it would be possible to earn the means of subsistence by some kind of labour during his college course, he resolved that he would make the attempt, and commenced at once to study some of the requisite subjects, to which up to that time he had given little or no attention.

Before undertaking a college, or, as we should say, a university course, James felt that considerable preparation was necessary as regards instruction in some of the higher branches of learning. Such teaching, he discovered, could be obtained at a high school or institute recently established at the little town of Hiram, in Ohio, and he promptly resolved to avail himself of the opportunity. On reaching the institute he presented himself to the board of trustees as a candidate for admission, explained his circumstances without reserve, avowed his determination to work for the means of living while a student, and requested employment as bell-ringer and sweeper to the establishment, to enable him to pay his way. It was resolved by the trustees that he should be accepted, and he was installed in these offices. Never, we are assured, was the bell rung more regularly and punctually, and never were the floors more thoroughly swept than when James Garfield was entrusted with the duty. No false shame or mistaken pride prevented him from undertaking such work with a worthy object; and he performed it well, because he had made it a rule of his life to do everything well that he engaged to do. Another of his principles was, that no kind of useful work was in itself degrading, if undertaken in a right

spirit; and in accordance with this view he continued to earn wages by working for a carpenter. So passed three years—attending classes, working at a trade, studying in private, reading books from the library of the institute, attending public meetings, and practising as a public speaker. In this last capacity he spoke with feeling and eloquence against slavery in the United States, and enunciated views on the subject that were remembered to his advantage in after times. With so much to absorb his attention, it is somewhat surprising to find him spoken of as exceedingly popular in the institute, but he seems never to have been too busy to be good-tempered, cheerful, and courteous. After a time he became a teacher in the institute; and though this promotion relieved him from sweeping and bell-ringing, he was nevertheless still obliged to labour in carpentering and farming. To shingle a roof or plane weatherboards, to work in the harvest field, or teach classes in the institute, were occupations into which he put his whole strength, while pursuing his own studies at the same time. It is not to be wondered at, therefore, that besides acquiring great proficiency in all the subjects taught in the institute, he also laid by a portion of his earnings for future use.

Garfield had determined to enter William's College, in the State of Massachusetts; and owing to the thoroughness of his preliminary studies, he passed with ease the prescribed examination, and took a high place among his fellow-students. His life at college was, in the main, a copy of that at the institute—hard study, careful reading, and teaching during vacations. He took his degree in 1856, his college career having been throughout as creditable to his character as the previous portions of his life. By desire of the trustees of the Hiram Institute

he returned to that establishment as teacher of ancient languages and literature, and in two years became the principal, having three hundred pupils under his instruction. How he became a member of the senate of his native State, took up arms against the Secessionists, and fought for freedom and the constitution of his country, can only be mentioned here. Higher and higher he rose in his country's service, till he became a general in her army, member of her supreme legislature, and finally President of the United States.

Thus the poor, friendless, little orphan, by his industry, perseverance, and integrity, was able to conquer poverty and all other obstacles in his path, and to rise, by successive steps, from being a farm boy and pupil in a bush school to be a college graduate, the principal of a great school, a member of Congress, and chief ruler of one of the greatest nations of the world.

---

## LESSON LXI.

### SOOTHING DRUGS.

Fa-tigued.  
Re-lief.  
Med-ic-a-ment.  
Nar-cot-ic.

Im-mem-o-ri-al.  
An-ti-qui-ty.  
U-ni-vers-al-ly.  
Ex-udes.

Juice.  
Con-stit-u-ents.  
Pois-on-ous.  
Health.

WHEN fatigued in body or disturbed in mind, men in all ages and countries have been prone to seek relief by the use of some drug or medicament which, by soothing the nervous system, deadens physical pain and produces forgetfulness of mental trouble. Some positive pleasure is also imparted by these substances, which are therefore partaken of by persons who feel neither pain nor anxiety, but use them simply for enjoyment.

The substances used for these purposes are all of vegetable origin, and differ in their nature or properties, though all possess one common characteristic, that of exerting a narcotic influence upon the human body. Some display this property in a higher degree than others, and the mode in which the system is affected varies in the case of each. In the hotter portions of Asia the betel-nut, opium, and the extract of hemp, have been used as narcotics from time immemorial, and the pepper plants have probably been applied to the same purposes from remote antiquity in the East Indian and some of the South Sea islands. The place of these plants is supplied in northern Europe by the hop, in Siberia by a fungus, among the Andes and Himalayas by the thorn apple. In South America the leaf of the coca plant is chewed with a similar object, and tobacco, in various forms, is universally used throughout the civilised world. It may be said of all these products that they constitute in themselves, or furnish by suitable preparation, valuable medicines, but so powerful in their operation as to be dangerous unless administered under the direction of competent professional authority.

With the exception of tobacco these drugs are little used in Australia, and some are altogether unknown. This is a fortunate circumstance, inasmuch as all produce terrible results when consumed in large quantities; and the habit of using them takes such hold upon its victims that it becomes most difficult, and sometimes impossible, to desist. Day by day the craving for the coveted narcotic grows stronger, and a larger quantity is required to produce the usual effect, until at length the constitution is utterly ruined or death takes place. In no instance are the pernicious effects of indulgence more manifest than in the case of opium.

This substance is obtained from the seed-vessels of a species of poppy, which is extensively cultivated in India and in Asia Minor. When the capsules, or seed-vessels, are ripening, incisions are made in them, when a milky juice exudes, which is allowed to thicken, and is then carefully collected. From this inspissated juice, the opium, the liquor laudanum is prepared, and the medicine called morphia extracted. Opium is, however, a substance possessing a highly complex chemical composition, most of its constituents being poisonous, as well as pain-allaying or sleep-producing. The proportions in which the several ingredients are found vary according to the kind of poppy, the soil and climate in which it is grown, and the mode of cultivation. Each ingredient contributes in its degree to the full effect of the opium, and it is not possible, on that account, to predict the exact consequence of using the drug, especially as much also depends upon the constitution and health of the individual.

The mode of taking opium differs in various parts of the world. In Turkey it is simply swallowed like a pill, while the Chinese smoke it as Europeans smoke tobacco. The few Europeans who have addicted themselves to the use of opium have generally taken it in the liquid form. The effects it produces are in general identical. It is the nervous system that is principally affected. The mind is exalted and exhilarated, the whole bodily frame experiences a feeling of pleasure, and eventually sleep is induced. An eastern traveller thus describes his first experiment in opium eating :—" After two hours and a half from the first dose my spirits became sensibly excited ; the pleasure of the sensation seemed to depend on a universal expansion of mind and matter. My faculties appeared enlarged ; everything I looked at seemed increased in volume ; I had no longer



the same pleasure when I closed my eyes which I had when they were open; it appeared to me as if it was only external objects which were acted on by the imagination, and magnified into images of pleasure; in short, it was 'the faint exquisite music of a dream' in a waking moment. I made my way home as fast as possible, dreading at every step that I should commit some extravagance. In walking, I was hardly sensible of my feet touching the ground; it seemed as if I slid along the street, impelled by some invisible agent, and that my blood was composed of some ethereal fluid which rendered my whole body lighter than air. I got to bed the moment I reached home. The most extraordinary visions of delight filled my brain all night."

The same writer thus describes the after-effects of his experiment:—"In the morning I rose pale and dispirited; my head ached, my body was so debilitated that I was obliged to remain on the sofa all day, dearly paying for my first essay at opium eating." If such be the effect of a single moderate dose, it is easy to imagine the consequences of swallowing a large one, or of contracting a habit of using opium. Death itself sometimes follows from taking a large dose, and consequences worse than death ensue from continuing the habit. In time the digestive organs become completely deranged, the eyes sunken, and the skin yellow; lameness, rigidity of the muscles, and curvature of the spine speedily follow; and the mental faculties as well as the bodily powers are weakened and destroyed. Such effects may also be witnessed among the degraded Chinese in Australia who are devotees of opium smoking. Repulsive in bodily appearance, and imbecile in mind, they present in their own persons the sternest warnings against the use of this seductive drug.

The difficulty of relinquishing the habit when once contracted, and the prostration of the will and moral sense which mainly occasion the difficulty, have been powerfully described by an English author, De Quincey, who, as well as Coleridge, was a confirmed laudanum drinker. "Think of me," he remarks after four months' struggle to abandon opium, "as of one still agitated, writhing, throbbing, palpitating, shattered, and much in the situation of him who has been racked."

Tobacco is more extensively used than opium, and its effects when used in moderation are far less destructive. The plant, which was indigenous to America, is now cultivated in tropical countries in both hemispheres, and in the warmer portions of the temperate zones. It requires a rich soil to grow in perfection, and the quality of the product is further greatly influenced by the climate and the mode of cultivation. The leaf, dried and otherwise prepared, is the part of the plant which is smoked, chewed, or snuffed, according to the taste of the person by whom it is used. Smoking is, however, the most prevalent mode in which tobacco is consumed, the fashion of snuff-taking and chewing having almost disappeared from among civilised nations.

Tobacco when used in either of these ways produces certain effects upon the human body, and also, in the end, upon the mind. These effects vary, however, in degree according to the mode of using the tobacco and the constitution of the user. There are many persons in whom a very small quantity produces nausea and nervous prostration, while others seem to smoke continuously throughout the day without apparent injury. When taken in moderate quantities by persons with whom it does not absolutely disagree, its usual effect is to calm and soothe the nervous system and the mental

faculties, and also to cause a slight degree of exhilaration without producing intoxication. Many persons, however, smoke tobacco without experiencing either of these pleasures, and for that reason regard the practice as simply waste of time. Others affirm that while the body is soothed, the mind is left at liberty to think without impediment. It seems clear, however, that, apart from mere habit, some pleasure must follow the indulgence in this narcotic, as otherwise it would be difficult to account for the fact that tobacco is used by so many millions of the human race. Whatever difference of opinion may exist as to the effects of a moderate use of tobacco, there is not the slightest uncertainty as to the consequences of indulgence to excess. Derangement of the digestive organs, disease of the stomach and liver, a morbid condition of the nervous system, paralysis, and even death, have been caused by the immoderate use of tobacco. All persons whose constitutions are immature or delicate suffer more than the full-grown or robust; but all need to be warned against over-indulgence. The young, in particular, should shun tobacco, for they cannot feel the craving which urges older persons to seek in it a solace in trouble, nor do they require any artificial stimulus to raise their spirits, while, on the other hand, they are most liable to feel the ill effects of its use.

The effects of tobacco upon the human frame, whether pleasurable or injurious, are due to the action of some of its chemical constituents. Of these, there are three which are of the greatest importance. The first is a volatile oil which is obtained from the leaves of the plant by distillation, but in very minute quantities, and which solidifies when it cools. This oil has a bitter taste and the peculiar odour of tobacco. It affects the organs of taste and smell in the same manner as tobacco smoke,

and when swallowed produces nausea and giddiness. The second constituent is the alkali *nicotine*, so named from the botanical designation of tobacco-nicotiana. Distillation with a little sulphuric acid and lime is the process by which this alkali is separated from the other constituents of tobacco, and the form in which it appears is that of a volatile, oily, colourless liquid. In taste and smell it resembles tobacco, but is acrid and burning to the tongue, and it is, moreover, a powerful narcotic poison. Even the vapour is irritating to the lungs, producing difficulty in breathing; and when a small dose is swallowed, the digestive organs are completely deranged. A larger quantity produces speedy death. Little less destructive is the empyreumatic oil which forms the third constituent. This is also obtained by distillation, but in a different way. It is also produced by burning tobacco in an ordinary pipe, and to it is due the discolouration observed in pipes made of meerschaum, or other substances capable of absorption. Like the other constituents of tobacco, this oil is of a highly poisonous nature, and causes death when taken internally.

Possessing ingredients of such a deadly nature, it is easy to understand how injurious, and even fatal, the effects of tobacco-smoking may be, and how necessary it is that the weed should be used with caution and moderation even by the strong and healthy. The young, the delicate, and those with whom it is found to disagree, should avoid tobacco altogether, if they desire to preserve their health and guard their constitutions from permanent injury.

## LESSON LXXI.

## THE CROCODILE.

Rep-tiles.	Re-spect-ive-ly.	Am-phi-bi-ous.
Tor-toise.	Croc-o-dile.	Mam-mals.
Rep-til-ian.	Al-li-ga-tor.	For-mid-a-ble.
Nat-u-ral-ists.	Ex-clu-sive-ly.	Pro-pul-sion.

REPTILES are seldom regarded with favour by mankind, however magnificent their colours and markings may be. The handsomest of the snakes is looked upon with aversion, and even with dread, although perhaps known to be harmless. The frog, with its cold clammy skin, is not more a favourite, and a tortoise is deemed too stupid to be interesting. It is probable, however, that the great lizards inspire greater disgust and fear than any other members of the reptilian class. Their appearance, disposition, and habits render them objects of general dislike, and yet they are in India held sacred, and in ancient Egypt were worshipped by the people.

Naturalists generally divide reptiles into four orders, which are represented by snakes, frogs, tortoises, and lizards respectively. This division is not universally accepted, however, crocodiles being, by some writers on zoology, considered as a distinct order on account of the hard, bony plates with which they are covered, and of the structure of the heart, which resembles that of birds and animals, rather than that of reptiles. There are numerous species of crocodiles, but it will be sufficient for our present purpose to arrange them in three groups, which are known as the true *crocodile*, which inhabits the Nile and other African rivers; the *gavial*, found in the warmer parts of Asia; and the *alligator*, which is exclusively American. The difference between them, upon which this division is founded, is chiefly in the arrange-



ment of the teeth. All of them are amphibious, living much in the water, though compelled to rise to the surface for the purpose of breathing. As regards food, they are carnivorous, devouring fishes and mammals. They will even attack man, and from their size and strength, and the nature of their teeth, are most dangerous antagonists.

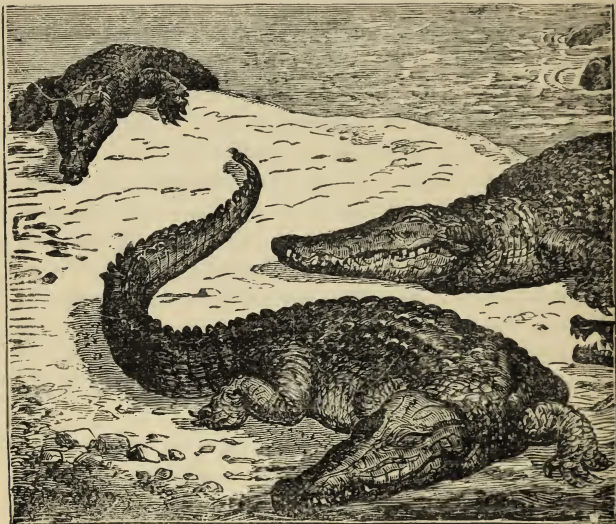
All the species of the crocodile genus resemble each other so closely, that the description of one will apply with tolerable accuracy to the whole, and the common or Nile crocodile may be taken as a type of the whole family. This reptile is frequently found twenty feet long, and has been seen of a much greater length, is of a greenish hue, spotted with brown, though the under parts are of a lighter colour. Its covering, in addition to the ordinary scales, consists of the bony plates before mentioned, which, on all exposed parts, are sufficiently hard and strong to resist a rifle bullet. The tail is long and compressed, and is a formidable weapon of attack, as well as a powerful instrument of propulsion in the water. The fore feet have five toes, the hind ones four, the three inner ones on each foot have claws, and all the feet are partially webbed. All the bones of the skull and face are firmly united together; each jaw has a single row of sharp teeth, which are conical in shape and directed backwards, and these are periodically shed and renewed to suit the growth of the animal. The ear is covered with a movable lid, and the eyes are protected with no less than three distinct lids. There is but one nostril, and the large, fleshy tongue is immovable. The vertebræ of the neck have small ribs attached to them, and this circumstance makes it difficult for the animal to turn, and thus affords an opportunity for escape to any person when attacked by one of these creatures. Under the throat are two glands, which secrete a peculiar musky

substance, which scents the animal's flesh even when it is dead.

From this description it will be seen that the crocodile is a creature dangerous to man. Many stories have been related of its daring and ferocity, as well as its cunning, in seizing and devouring human beings, and also of hair-breadth escapes from its powerful jaws. It is assumed that the animal can be compelled to relax its hold if the person seized has presence of mind to thrust his fingers into its eyes, though he may be again attacked. In spite of its strength and cunning, it is not difficult to capture a crocodile. Waterton, when describing his adventures in South America, explains how he not only contrived to secure an enormous alligator, but also to ride upon its back. Having few vulnerable parts, and those not usually exposed, the crocodile can afford to despise all ordinary weapons, with the exception of the rifle in the hands of an experienced hunter. In the following extract from a work by Sir Samuel Baker, an interesting account is given of the cunning of the Nile crocodile, as observed by him in one of the tributaries of that river.

“We were strolling along the margin of the river, when we heard a great shrieking of women on the opposite side, in the spot from which the people of Sofi fetch their water. About a dozen women had been filling their water-skins, when suddenly they were attacked by a large crocodile, who attempted to seize a woman, but she, springing back, avoided it, and the animal swallowed her girba (water-skin), that, being full of water and of a brown exterior, resembled the body of a woman. The women rushed out of the river, when the crocodile made a second dash at them, and seized another water-skin that a woman had dropped in

her flight. They believe this to be the same monster that took a woman a few months ago. Few creatures are so sly and wary as the crocodile. I watch them continually as they attack the dense flocks of small birds that throng the bushes at the water's edge. These birds are perfectly aware of the danger, and they fly from the



attack, if possible. The crocodile then quietly and innocently lies upon the surface, as though it had appeared quite by accident; it thus attracts the attention of the birds, and it slowly sails away to a considerable distance, exposed to their view. The birds, thus beguiled by the deceiver, believe that the danger is removed, and they again flock to the bush, and once more dip their thirsty beaks into the stream. Thus

absorbed in slaking their thirst, they do not observe that their enemy is no longer on the surface. A sudden splash, followed by a huge pair of jaws beneath the bush that engulphs some dozens of victims, is the signal unexpectedly given of the crocodile's return, who has thus silyly dived, and hastened under cover of water to his victims. I have seen the crocodiles repeat this manœuvre constantly ; they deceive by a feigned retreat, and then attack from below.

“In like manner, the crocodile perceives, while it is floating on the surface in mid-stream, or from the opposite side of the river, a woman filling her girba, or an animal drinking, etc. Sinking immediately, it swims perhaps a hundred yards nearer, and again appearing for an instant upon the surface, it assures itself of the position of its prey by a stealthy look ; once more it sinks, and reaches the exact spot above which the person or animal may be. Seeing distinctly through the water, it generally makes its fatal rush from beneath, sometimes seizing with the jaws, and at other times striking the object into the water with its tail, after which it is seized and carried off. The crocodile does not attempt to swallow a large prey at once, but generally carries it away and keeps it for a considerable time in its jaws in some deep hole beneath a rock or the root of a tree, where it eats it at leisure.” This preference of the crocodile for food in process of decomposition has often been noticed, and it has further been alleged that they hide their prey, as dogs are known to do, until they consider it fit for eating.

Like other reptiles, crocodiles are oviparous. Their eggs are small compared with the size of the animal, and are covered with an extremely hard, horny case. They are deposited in sand or mud, where they are hatched by the heat of the sun. The female is believed

to keep watch over the eggs and to guard the young, both being in danger from the attacks of the ichneumon and mongoose, which share with man his detestation of the dreaded reptile.

Until late years Australia was supposed to be entirely free from these creatures. It is now known, however, that they abound in the northern rivers, and that neither man nor beast is safe from their ravages when opportunity favours their attack. It is, therefore, necessary to approach all these streams with caution, and to be especially careful in venturing into the water alone and unprotected.





## APPENDIX OF ROOTS AND DERIVATIONS.

### SAXON PREFIXES.

**A**, *on, in, or to*; as, a-foot, *on* foot; a-bed, *in* bed; a-far, *at* a great distance; a-field, *to* the field.

**Be**, *to make, before, or about*; as, be-dim, to make dim; be-speak, to order before; be-sprinkle, to sprinkle about.

**En**, *in or into*; as, en-camp, to form into a camp; en-tomb, to put into the tomb. It also means *to make*; as, en-large, to make large. *En* is changed into *em* before words beginning with *b* or *p*; as, em-balm, empower.

**Fore**, *before*; as, fore-ordain, to fix before.

**Mis**, *ill, error, or defect*; as, mis-behave, to behave badly; mis-guide, to lead in a wrong way;

mis-calculate, to make an error in sums.

**Out**, *beyond or excess*; as, out-bid, to bid beyond; out-wear, to wear too long.

**Over**, *above, too high, or too much*; as, over-leap, to jump over; over-charge, to charge too much.

**Un**, BEFORE A VERB, means the undoing of the act expressed by the verb; as, un-furl, to roll down; un-close, to open up. BEFORE AN ADJECTIVE, it means *not*; as, un-clean, not clean.

**Under**, *beneath or inferiority*; as, under-mine, to dig beneath; under-clerk, one below the chief clerk.

**With**, *from or against*; as, with-draw, to draw from; with-stand, to stand against.

### LATIN PREFIXES.

**A, Ab, Abs**, *from or away*; as, a-vert, to turn from; ab-solve, to loose from; abs-tain, to hold from.

**Ad**, *to*; as, ad-here, to stick to.

**Ad** has also the forms of **A, Ac, Af, Ag, Al, An, Ap, Ar, As, At**; as, a-scend, to mount to; ac-cept, to take to; af-flict, to dash to; ag-gravate, to make heavy to; al-luvial, washed down to; an-nul, to bring to nothing; ap-pel, to call to; ar-guate, to seek more power to; as-sume, to take to; at-tract, to draw to.

**Am**, *round about*; as, am-putate, to cut round about.

**Ante**, *before*; as, ante-cedent, going before.

**Circum, Circu**, *round about*; as, circum-navigate, to sail round the globe.

**Cis**, *on this side*; as, cis-alpine, on this side of the Alps.

**Con**, *together*; as, con-nect, to fasten together. **Con** has also the forms of **Co, Cog, Col, Com, Cor**; as, co-here, to stick together; cog-nate, born together; col-lect, to gather together; com-pose, to put together; correct, to make straight together with.

**Contra or Counter**, *against*; as, contra-dict, to say against;

counter-balance, to weigh against.

**De**, *down*; as, de-scend, to go down.

**Dis**, *asunder*; as, dis-tend, to stretch asunder. It has also the forms of **Di** and **Dif**; as, di-perse, to scatter asunder; dif-fer, to carry asunder (vary).

**E**, **Ex**, *out of*; as, e-ject, to throw out; ex-claim, to call out. It has also the forms of **Ec** and **Ef**; as, ec-centric, out of the centre (odd); ef-flux, a flowing out.

**In**, BEFORE A VERB, means *in, into, on, or upon*; as, in-clude, to shut in; in-hume, to put into the ground; im-pel, to drive on. It has also the forms of **Il**, **Im**, **Ir**; as, il-lumine, to make light in; im-port, to carry in; ir-rigate, to let water into.

**In**, BEFORE AN ADJECTIVE, means *not*; as, in-correct, not correct. It has also the forms of **Ig**, **Il**, **Im**, **Ir**; as, ig-noble, not noble; il-liberal; not generous; im-mortal, not dying; ir-revocable, not to be called back.

**Inter**, *between or among*; as, inter-pose, to place between. It has also the form **Intel**; as, intel-lectual.

**Intro**, *within*; as, intro-duce, to lead within.

**Juxta**, *near to*; as, juxta-position, being placed near to.

**Ob**, *against, in the way of, or out*; as, ob-ject, to throw in the way of; ob-trude, to thrust out. It has also the forms of **Oc**, **Of**, **Op**; as, oc-cur, to run in the way of; of-fer, to bring in the way of; op-press, to press against.

**Per**, *through or thoroughly*; as, per-vade, to go through; per-fectly, thoroughly done. It has also

the form of **Pel**; as, pel-lucid, shining through (clear).

**Post**, *after*; as, post-pone, to place after.

**Pre**, *before*; as, pre-pare, to make ready before.

**Preter**, *beyond*; as, preter-natural, beyond the course of nature.

**Pro** (FRENCH form **Pur**), *for, forth, or forward*; as, pro-ceed, to go forward; pur-vey, to look forth (provide).

**Re**, *back or again*; as, re-cline, to lean back; re-form, to shape again.

**Retro**, *backwards*; as, retro-spect, a looking backwards.

**Se**, *aside, apart, or from*; as, se-lect, to choose from; se-duce, to lead aside.

**Sine**, **Sin**, or **Sim**, *without*; as, sine-cure, without care; sin-cere, without wax or mixture (unfeigned); sim-ple, without a fold.

**Sub**, *under*; as, sub-scribe, to write under. It has also the forms of

**Su**, **Suc**, **Suf**, **Sug**, **Sup**, **Sus**; as, su-spect, to look under; suc-ceed, to come after; suf-fuse, to pour under or over; sug-gest, to carry under; sup-port, to carry under (to hold up); sus-tain, to hold under.

**Subter**, *under or beneath*; as, sub-ter-fuge, a flying under or beneath (a shift).

**Super** (FRENCH form **Sur**), *over, above*; as, super-incumbent, lying above; sur-tout, over all.

**Trans**, *over, beyond, or across*; as, trans-parent, appearing through (clear). It has also the forms of **Tra** and **Traf**; as, tra-ject, to cast over (a ferry); traf-fic, to carry goods over.

**Ultra**, *beyond*; as, ultra-montane, beyond the mountains.

## GREEK PREFIXES.

**A** or **An**, *without*; as, a-chromatic, without colour; an-archy, without government.

**Amphi** or **Ambi**, *both, two*; as,

amphi-bious, capable of living in land or water (two lives); ambi-dexterous, clever with both hands,

**Ana**, *through or up*; as, ana-tomy, a cutting up.

**Anti** or **Ant**, *against*; as, anti-Christian, opposite to Christianity; ant-arctic, opposite the north (and therefore southern).

**Apo** or **Ap**, *from or away*; as, apostacy, a departure from religion; ap-helion, the point in a planet's orbit farthest away from the sun.

**Dia** or **Di**, *through or asunder*; as, dia-gonal, a line passing through opposite corners; dia-rrhœa, a flowing through.

**En** or **Em**, *on or in*; as, en-ergy, power in a body; em-phasis, strength in a word or sentence.

**Epi**, *upon*; as, epi-taph, a writing on a tombstone.

**Ex**, *out of*; as, ex-odus, a going out.

**Hupo**, *under*; as, hypo-thesis, a placing under.

**Kata**, *down*; as, catarrh, a flowing down.

**Meta**, *after, change*; as, metaphor, carrying a word beyond its original meaning.

**Para**, *side by side, like or similar*; as, para-ble, a placing two things together for comparison.

**Peri**, *round about*; as, peri-meter, the measurement round the outside.

**Syn**, *together*; as, syn-agogue, a place where the Jews meet together to worship. It has also the forms of **Sy**, **Syl**, and **Sym**; as, sy-stem, a standing together (to make a proper whole); syl-lable, taken together with the lips; sym-path-y, a feeling with or together.

## POSTFIXES.

**NOUNS**. — **Nouns** denoting THE STATE OF BEING are formed by adding **acy**, **age**, **ance**, **ancy**, **ary**, **ence**, **ency**, **ety**, **head**, **hood**, **ism**, **ment**, **mony**, **ness**, **ry**, **th**, **tude**, **ty**, **ity**, **ure**, **y**. Thus: false, fallacy, the state of being false; obstinate, obstinacy, the state of being obstinate; merry, merriment, the state of being merry.

**Nouns** meaning the INDIVIDUAL (person or object) THAT IS OR DOES A THING, are formed by adding **an**, **ant**, **ar**, **ard**, **art**, **ary**, **ate**, **ee**, **eer**, **ier**, **ent**, **er**, **ist**, **ite**, **ive**, **or**, **ster**, **yer**. Thus: librarian, one who keeps a library; music, musician, one who studies music; claim, claimant, one who claims; command, commander, one who commands.

**Nouns** denoting the ACT OF are formed by adding **ation**, **ion**, **ition**, **ure**, **ture**; as, tax, taxation, the act of laying on taxes; dispose, disposition, the act of disposing.

**Nouns** meaning POWER, OFFICE.

OR JURISDICTION, are formed by adding **acy**, **dom**, **ric**, **ure**, **ship**; as, abbot, abbacy, the office of an abbot; professor, professorship, the office of a professor.

**Nouns** are decreased in meaning by the following postfixes, which are therefore called DIMINUTIVES: **icle**, **cule**, **ule**, **kin**, **et**, **let**, **ock**, **ling**. Thus: part, particle, a small part; lamb, lambkin, a little lamb.

**VERBS**. — **Verbs**, meaning TO MAKE, are formed from nouns and adjectives by adding **ate**, **en**, **fy**, **ish**, **ise** or **ize**. Thus: regular, regulate, to make regular; authentic, authenticate, to prove to be correct.

**ADJECTIVES**. — **Adjectives** meaning FULL OF OR ABUNDANCE are formed by adding **ate**, **ful**, **ive**, **ose**, **ous**, **some**, **y**. Thus: beauty, beautiful, full of beauty; joke, jocose, full of jokes.

**Adjectives** denoting SIMILARITY or LIKENESS are formed by adding **ish**, **like**, **ly** (contracted for like). Thus: child, childish,

like a child; brother, brotherly, like a brother.

**Adjectives** meaning OF OR BELONGING TO are formed from nouns by adding **ac, aceous, al an, ar, ary, ic** or **ical, ern, id, ile, ine, ish**. Thus: demon, demoniac, pertaining to a demon; herb, herbaceous, belonging to an herb; west, western, pertaining to the west.

**Adjectives** are formed from nouns or verbs TO INDICATE POWER IN AN ACTIVE SENSE by adding **ive**, and in a PASSIVE SENSE by **able, ible, ile, uble**. Thus: persuade, persuasive, having power to persuade; eat, eatable, that which can be eaten; dis-

cern, discernible, that which can be seen.

**Adjectives** meaning WITHOUT OR PRIVATION are formed by adding **less**. Thus: harm, harmless, without harm.

**Adjectives** have their meaning decreased by adding **ish**. Thus: black, blackish, somewhat black.

**Adjectives** meaning MADE OF are formed by adding **en**. Thus: gold, golden, made of gold.

**ADVERBS**.—**Adverbs** of MANNER or DIRECTION are formed by adding **ly, wise, ward**. Thus: faithful, faithfully, in a faithful manner; other, otherwise, in another way; ward, homeward, in the direction of home.

## LATIN ROOTS.

**Acidus**, *sour*; **Acer, Acris**, *sharp*; acrid, acidity, acid.

**Aedes**, *a house*; edify, edifice.

**Aequus**, *equal, just*; equality, inadequate, equator, equilibrium.

**Aer**, *air*; aerial, artery, aeronaut, aeriform.

**Aevum**, *an age*; co-eval, primeval.

**Ager, Agri**, *a field*; agriculture, agrarian.

**Agger**, *a heap*; exaggerate.

**Ago, Actum**, *to do*; agent, agile, actor, agitate, prodigal, enact.

**Ala**, *a wing*; aisle.

**Alacer**, *cheerful*; alacrity.

**Albus, white**; alb, Albion, albino, alburnum.

**Alienus**, *belonging to another*; alien, alienate.

**Alo, Alitum**, *to nourish*; aliment, alimony, almoner.

**Alter, another**; alter, unalterable, alternate.

**Altus, high**; exalt, altitude, altar.

**Ambulo, to walk**; amble, preamble, perambulator, somnambulist.

**Amo, to love**; **Amor, love**; **Amicus**, *a friend*; amorous, amiable, enamour, amicable, enmity, inimical.

**Amplus, large**; ample, amplify.

**Ango, Anxi, to vex**; anguish, anxiety, anger.

**Angulus, a corner**; angle, triangle, rectangular.

**Animus, the mind**; animate, animadvert, magnanimity, unanimous.

**Annus, a year**; annals, annual, biennial, anniversary, millennium, perennial, superannuate, annuity.

**Antiquus, old**; antic, antique, antiquarian.

**Aperio, Apertum, to open**; aperient, aperture, April.

**Aptus, fit, meet**; apt, aptitude, inept.

**Aqua, water**; aquatic, aqueduct, aqueous, terraqueous, aquarium.

**Arbiter, a judge**; arbitrary, arbitrate.

**Arbor, a tree**; arbour, arboraceous.

**Arceo, to drive away**; coerce, exercise.

**Ardeo, Arsum, to burn**; ardent, ardour, arson.

**Argentum, silver**; argent, argentine.

**Arguo, to prove**; argue, argument.

**Arma, arms**; arm, armour, armistice, disarm, armament.

**Aro, to plough**; arable.



- Ars, Artis**, *art*; artful, artist, artizan, artificial, inert.
- Artus**, *a joint*; article, articulate.
- Asper**, *rough*; exasperate, asperity.
- Astrum**, *a star*; asterisk, disaster, asteroid.
- Atrox**, *cruel*; atrocity; atrocious.
- Audio, Auditum**, *to hear*; audible, audit, audience, auditory.
- Augeo, Auctum**, *to increase*; augment, auction, author, unauthorised.
- Auris**, *the ear*; aurist, auricular.
- Auxilium**, *help*; auxiliary.
- Avis**, *a bird*; aviary, auspices, in-augurate.
- Bacchus**, *the god of wine*; bacchanal, debauch, debauchee.
- Barba**, *a beard*; barb, barber, barbel.
- Beatus**, *blessed*; beatitude, beatific.
- Bellum**, *war*; rebel, belligerent.
- Bellus**, *beautiful*; embellish.
- Bene**, *well*; benefit, benediction, unbeneficed, benefactor.
- Bibo**, *to drink*; bib, bibber, imbibe.
- Bini**, *two by two*; **Bis**, *twice*; binary, binocular, combine, biscuit, bisect, bigamist, biennial, biped.
- Bonus**, *good*; boon, bounty.
- Brevis**, *short*; brief, brevity, abbreviate, abridge.
- Bursa**, *an ox-hide, a purse*; bursary, disburse, purser.
- Caballus**, *a horse*; cavalry, cavalcade.
- Cado, Casum**, *to fall*; case, cadence, casual, accident, decay, cascade, coincide, decadence.
- Caedo, Caesum**, *to cut, to kill*; circumcise, decide, homicide, suicide.
- Calor**, *heat*; caloric, caudle, caldron.
- Calx, Calcis**, *limestone*; **Calculus**, *a small stone*; calx, calcareous, calculus, calculation, incalculable.
- Campus**, *a plain*; camp, decamp, champion, campaign.
- Candeo**, *to be white, to glow, to shine*; candid, candle, chandelier, incense, incendiary, candidate.
- Canis**, *a dog*; canine, kennel.
- Cano**, *to sing*; **Carmen**, *a song*; cant, precentor, recant, incantation, charm, charmer.
- Capillus**, *hair*; capillary.
- Capio, Captum**, *to take*; capable, capture, captor, conceive, reception, incipient, susceptible, anticipate, recipe.
- Caput, Capitis**, *the head*; cape, capital, precipice, chapter, cap, chieftain, achieve.
- Carbo**, *coal*; carbon, carbonic, carboniferous, carbuncle.
- Carcer**, *a prison*; incarcerate.
- Caro, Carnis**, *flesh*; carnal, carnation, carnivorous, carnival, charnel, carrion.
- Carrus**, *a waggon*; car, supercargo, carriage.
- Carus**, *dear*; cherish, caress, charity.
- Causa**, *a cause*; **Cautus**, *wary*; cause, accuse, excuse, recusant, cautious, precaution.
- Cavus**, *hollow*; cave, cavity, cavern, excavate.
- Cedo, Cessum**, *to go, to yield*; cede, cession, successor, procession, secede, deceased, necessity, intercessor.
- Celer**, *swift*; celerity, accelerate.
- Censeo, Censum**, *to judge, to value, to blame*; censor, census, censure.
- Centrum**, *the centre*; concentric, centrifugal, centripetal.
- Centum**, *a hundred*; century, centurion, centuple, centipede.
- Cerno, Cretum**, *to sift, to see, to distinguish*; concern, discernment, discreet, secret, secrete.
- Cete**, *whales*; cetaceous, spermaceti.
- Charta**, *paper*; chart, card, cartel, cartridge, discard.
- Cingo, Cinctum**, *to bind*; cincture, precinct, succinct.
- Cito, Citatum**, *to call, to summon*; cite, excite, citation, reciter, resuscitate.
- Civis**, *a citizen*; civic, civil, civilise, uncivil, civilian.



- Clamo, Clamatum**, *to cry, to shout*; claim, acclaim, declamation, exclamatory, proclaim, reclaim.
- Clarus**, *clear*; clarify, declare.
- Claudo, Clausum**, *to shut*; clause, close, cloister, conclude, exclusive, recluse, seclusion.
- Clemens**, *mild*; clemency, inclemency.
- Clino**, *to bend, to lean*; decline, recline, inclination, clinical.
- Coelum**, *heaven*; celestial, ceiling.
- Colo, Cultum**, *to cultivate*; colony, colonist, colonial, culture.
- Comes, Comitis**, *a companion*; count, county, concomitant.
- Copia**, *plenty*; copious, cornucopia.
- Coquo, Coctum**, *to boil, to ripen, to digest*; cook, cookery, decoction, concoct, precocious.
- Cor, Cordis**, *the heart*; cordial, concord, discord.
- Cornu**, *a horn*; cornea, capricorn, unicorn, cornucopia, cornet.
- Corpus, Corporis**, *the body*; corpulent, corporal, incorporate, corpse, corps.
- Costa**, *a rib or side*; coast, intercostal, accost.
- Cras, to-morrow**; procrastinate.
- Credo, Creditum**, *to believe, to trust*; creed, credit, credible, credulous.
- Creo, Creatum**, *to create*; creator, creative, recreation, increate.
- Creπο, Crepitum**, *to crackle*; crevice, decrepit, discrepancy.
- Cresco, Cretum**, *to grow*; crescent, increase, accrue, excrescence.
- Crimen, Criminis**, *a charge, a crime*; criminal, recriminate.
- Cruz, Crucis**, *the cross*; crosier, crucible, crucifix, crusade, cruise, exorcise.
- Cubo, Cubitum**, *to lie down*; incumbent, incubation, succumb, cub.
- Culpa**, *a fault*; culprit, culpable, exculpate.
- Cumulo**, *to heap up*; accumulate, cumulative.
- Cura**, *care*; cure, curate, sinecure, curator.
- Curro, Cursum**, *to run*; incur, current, recur, course, courier, excursion.
- Curtus**, *short*; curt, curtail.
- Curvus**, *crooked*; curve, curvature, curvilinear.
- Cutis**, *the skin*; cuticle, cutaneous.
- Damnum**, *loss, hurt*; damage, condemn, indemnity.
- Debitus**, *due, owing*; debt, debtor, debit, due.
- Decem**, *ten*; December, decimal, decimate.
- Decor**, *grace, comeliness*; decorum, decorate, indecorous.
- Dens, Dentis**, *a tooth*; dentist, indentation, trident, indenture.
- Densus**, *thick, close*; dense, density, condense.
- Deus, God**; deist, deify, deity.
- Dexter**, *right handed*; ambidexterous, dexterity, dexterous.
- Dicatum**, *set apart*; abdicate, dedication, index, predicate.
- Dico, Dictum**, *to say, to tell*; diction, dictate, contradict, edict, indite, dictionary, valedictory, preach.
- Dies**, *a day*; dial, diary, diurnal, journal, adjourn.
- Dignus**, *worthy*; dignity, deign, condign, undignified.
- Do, Datum**, *to give*; add, date, condition, editor, perdition.
- Doceo, Doctum**, *to teach*; docile, doctor, doctrine, document.
- Doleo**, *to grieve*; dolor, condole, doleful, indolent.
- Dominus**, *a master, a lord*; domain, domineer, don, predominate.
- Domus**, *a house*; dome, domestic, domicile.
- Donum**, *a gift*; donor, donee, donation, condone, pardon.
- Dormio, Dormitum**, *to sleep*; dormant, dormitory, dormouse.
- Duco, Ductum**, *to bring, to lead*; duct, duke, abduct, aqueduct, conductor, product, traduce, unproductive, seduce, educate.
- Dulcis**, *sweet*; dulcet, dulcimer.
- Duo**, *two*; dual, duel, duet, double, duplicate.

- Durus**, *hard*; dure, endurance, durable, obdurate.
- Ebrius**, *drunken*; ebriety, inebriate, sobriety.
- Edo**, *to eat*; edible.
- Emo, Emptum**, *to buy*; **Promptus**, *ready*; redeem, exemption, peremptory, prompt.
- Ens, Entis**, *a being*; **Esse**, *to be*; absent, entity, essence, presence.
- Eo, Itum**, *to go*; exit, circuit, ambient, ambitious, transition, perish, transit, sedition.
- Equus**, *a horse*; equestrian, equip, equerry.
- Erro**, *to wander*; err, arrant, aberration, erratum, erratic.
- Estimo**, *to value*; esteem, estimation, inestimable.
- Faber**, *a workman*; fabric, fabricate.
- Facilis**, *easy*; facility, difficulty, faculty.
- Facio, Factum**, *to make, to do*; fact, feat, factory, counterfeit, deficient, imperfect, orifice, malefactor, office, profit, artifice, rectify.
- Fallo, Falsum**, *to deceive*; false, falsetto, infallible.
- Fames**, *hunger*; famine, famish.
- Fanum**, *a temple*; fane, fanatic, profanation.
- Fari**, *to speak*; affable, ineffable, fate, infant, preface.
- Fatigo**, *to tire, to weary*; fatigue, indefatigable.
- Felis**, *a cat*; feline.
- Felix**, *happy*; felicity, felicitate.
- Femina**, *a woman*; female, effeminate.
- Fendo, Fensum**, *to keep off*; fence, defend, offensive.
- Fero**, *to carry, to bring*; ferry, confer, circumference, differ, unfertile, vociferate.
- Ferrum**, *iron*; ferruginous, farrier.
- Filius**, *a son*; filial, affiliate.
- Fervio**, *to grow hot*; fervour, fervent, fervid, effervesce.
- Fido**, *to trust*; **Fidelis**, *faithful*; confide, diffident, fidelity, infidel.
- Filum**, *a thread*; filament, filter.
- Fingo, Fictum**, *to feign, to make a show of, to invent*; feign, fiction, figment, figurative, fictitious.
- Finis**, *an end*; final, finish, indefinite.
- Firmus**, *strong*; affirm, confirmation, infirmity, affirmative.
- Flecto, Flexum**, *to bend*; flexible, reflector, genuflexion.
- Fligo, Flictum**, *to beat, to strike*; affliction, conflict, inflict.
- Flos, Floris**, *a flower*; floral, flour, flourish, florist.
- Fluctus**, *a wave*; fluctuate.
- Fluo, Fluxum**, *to flow*; fluent, fluid, reflux, superfluous.
- Folium**, *a leaf*; foliage, foil, folio, trefoil.
- Forma**, *a shape, a form*; form, uniform, conform, reformatory, nonconformist.
- Foro**, *to bore, to pierce*; perforate.
- Fors, Fortis**, *chance, luck*; fortune, fortuitous, unfortunate.
- Fortis**, *strong*; fort, fortress, fortification, force, pianoforte, *aqua-fortis*.
- Frango, Fractum**, *to break*; fracture, frail, fragile, refraction, infringe.
- Frater**, *a brother*; fraternal, fratricide.
- Fraus, Fraudis**, *deceit*; **Frustra**, *in vain*; fraud, fraudulent, frustrate.
- Frico, Frictum**, *to rub*; friction.
- Frigus**, *cold*; frigid, refrigeration.
- Frons, Frontis**, *the forehead*; front, frontispiece, frontier.
- Fugio, Fugitum**, *to flee or fly*; refuge, refugee, fugitive, subterfuge.
- Fulgeo**, *to shine*; refulgent, effulgence.
- Fumus**, *smoke*; fume, fumigate, perfume.
- Fundo, Fusum**, *to pour, to melt*; fusible, foundry, diffusion, refund.
- Fundus**, *the bottom*; founder, foundation, profound.
- Futo**, *to disprove*; confute, refutation, irrefutable.

- Gelu**, *frost*; gelid, congeal, gelatinous, jelly.
- Genus, Generis**, *a kind, a race*; gender, degeneration. unregenerate.
- Gens, Gentis**, *a nation*; gentile, gentry, gentle.
- Genu**, *the knee*; genuflexion.
- Gero, Gestum**, *to carry, to bring*; digest, gesticulate, belligerent, congestion, register, suggestive, vice-gereat.
- Germen**, *a bud*; germ, germination.
- Gigno, Geno, Genitum**, *to beget*; genial, genitive, indigenous, progenitor.
- Glacies**, *ice*; glacier, glazier, glass.
- Gladius**, *a sword*; gladiator.
- Glomus, Glomeris**, *a clue*; glomerate.
- Gradior**, *to go*; **Gradus**, *a step*; grade, gradient, graduate, egress, retrograde, progression, transgressor.
- Gramen**, *grass*; graminivorous.
- Grandis**, *great*; grandeur, grandiloquent, grandee.
- Granum**, *a grain of corn*; granary, granule, granite, garner.
- Gratus, grateful; Gratia**, *favour*; grace, agreement, disagree, congratulate, gratis.
- Gravis**, *heavy*; grave, grief, agrieve, aggravation.
- Grege, Gregis**, *a flock*; gregarious, egregious, congregation.
- Gusto**, *to taste*; **Gustus**, *a sense of feeling*; gusto, disgust.
- Habeo, Habitum**, *to have, to dwell*; habit, inhabitant, exhibition, prohibit.
- Haereo, Haesum**, *to stick*; adhere, cohesion, hesitate, incoherent.
- Haeres, Haeredes**, *an heir*; inheritance, disinherit, hereditary.
- Halo**, *to breathe*; exhale, exhalation, inhale.
- Haurio, Haustum**, *to draw*; exhaust, inexhaustible.
- Homo**, *a man*; homicide, human, homage, inhumanity.
- Honor, honour**; honorary, dishonourable, honest.
- Hora**, *an hour*; horologe, horoscope.
- Hortus**, *a garden*; horticulture.
- Hospes, Hospitis**, *a guest, one who lodges*; hospitable, hospital, hotel.
- Hostis**, *an enemy*; host, hostile.
- Humeo**, *to be wet or moist*; humid, humidity, humorous.
- Humus**, *the ground*; exhume, posthumous.
- Idem**, *the same*; identify, identical.
- Ignis, fire; ignite, igneous.**
- Imitor**, *to copy*; **Imago, Imaginis**, *an image*; imitation, inimitable, imagination.
- Impero**, *to command*; **Imperium**, *power*; empire, imperial, imperative.
- Inanis**, *empty*; inane, inanity.
- Inferus**, *below*; inferior, infernal.
- Initium**, *a beginning*; initiate, initial.
- Insula**, *an island*; insular, peninsula, island, islet.
- Integer**, *entire*; integral, disintegrate, integrity.
- Ira**, *anger*; ire, irascible.
- Iter, Itineris**, *a journey*; itinerant, itinerary.
- Iterum**, *again*; iteration, reiterate.
- Jaceo**, *to lie*; adjacent, circumjacent.
- Jacio, Jactum**, *to throw*; abject, adjective, dejection, ejaculate, object, projectile.
- Janua, a gate; janitor.**
- Judex, Judicis**, *a judge*; judicial, judgment, adjudicate, prejudicial.
- Jugum**, *a yoke, a pair*; conjugate, subjugate, conjugal.
- Jungo, Junctum**, *to join*; joint, juncture, disjunctive, subjoin.
- Juro**, *to swear*; jury, juror, abjure, perjury, conjure.
- Jus, Juris**, *right, law*; jurisdiction, injure, injury, jurisprudence.
- Justus**, *lawful, upright*; justice, justiciary, justify, unjust.

**Juvenis**, *young*; juvenile, junior.

**Juvo, Jutum**, *to help*; adjutant.

**Labor, Lapsus**, *to fall, to slide*; elapse, collapse, relapse.

**Labor, labour**; labourer, laboratory, elaborate.

**Lac, Lactis, milk**; lacteal, lactary.

**Laedo, Laesum**, *to strike, to hurt*; collide, collision, elide.

**Lapis, Lapidis**, *a stone*; lapidary, delapidate.

**Latum**, *to carry, to bring*; collate, dilatory, oblation, prelate.

**Latus, Lateris**, *a side*; equilateral, collateral, quadrilateral.

**Laudo, to praise; Laus, Laudis**, *praise*; laud, applause, plaudit.

**Lavo, Lotum**, *to wash*; lave, lotion, laundry, lava, lavatory.

**Laxus**, *loose*; lax, prolixity, relaxation.

**Lego, Lectum**, *to read, to gather, to choose*; legible, lecturer, lesson, collect, college, elector.

**Lego, Legatum**, *to send, to bequeath*; legate, delegate, legacy.

**Lenis, gentle, soft; lenity, relent, lenient.**

**Leo, a lion**; leonine.

**Lex, Legis**, *a law*; legal, legitimate, legislature.

**Liber, free; liberate, illiberal, liberty, deliver.**

**Liber, the inner bark of a tree, a book; library, libel.**

**Liceo, Licitum**, *to be lawful*; illicit, licence, licentiate.

**Linea, a line; lineal, linear, lineament, lineage, rectilinear.**

**Linquo, Lictum**, *to leave*; relinquish, relict, relic.

**Lis, Litis**, *strife*; litigant, litigious.

**Litera, a letter; literal, literature, alliteration, illiterate.**

**Loquor, Locutum**, *to speak*; loquacity, elocution, colloquial, soliloquy, ventriloquist.

**Luceo, to shine; Lux, Lucis**, *light*; lucid, elucidate, pellucid, Lucifer.

**Lucrum**, *gain*; lucre, lucrative.

**Luctor**, *to struggle*; reluctant.

**Lumen, Luminis**, *light*; luminary, illuminate.

**Luna, the moon**; lunatic, lunacy, lunar, sublunary.

**Luo, Lutum**, *to wash, to purge*; ablution, alluvial, dilute, antediluvian.

**Macula, a spot, a fault; immaculate.**

**Magister, a master**; magistrate, magisterial, master.

**Magnus, great; Major, greater, Maximus, greatest**; magnify, magnitude, magnanimous, majestic, majority, main.

**Malleus, a hammer**; mallet, maul, malleable.

**Malus, bad, evil; Male, wickedly**; malady, malcontent, malediction.

**Mando, to chew**; mandible, masticate.

**Maneo, Mansum**, *to stay, to abide*; manse, mansion, permanent.

**Mano, to flow**; emanate.

**Manus, the hand**; manual, maintain, manufacturer, manuscript, manacle.

**Mare, the sea**; mariner, maritime, submarine, ultramarine.

**Mars, Martis, the god of war**; martial, March.

**Maturus, ripe**; mature, maturity, premature.

**Medius, the middle**; medium, mean, medial, intermediate.

**Medeor, to cure, to heal**; medical, medicine, remedy.

**Meditor, to think or muse upon**; meditate, premeditation.

**Mel, Mellis, honey**; melody, mellifluous.

**Melior, better**; ameliorate.

**Mens, Mentis, the mind**; mental, commentary, dementate.

**Mercor, to buy, to traffic**; merchant, commercial, mercenary.

**Mereo, to deserve, to earn**; merit, meritorious, demerit.

**Mergo, Mersum, to plunge, to overwhelm**; merge, immersion.

**Meridies, mid-day**; meridian.

**Metior, Mensum, to measure**; mete, metre, commensurate.

**Migro, to remove**; emigrate, migration, transmigration.



- Miles, Milites**, *a soldier*; military, militia, militant.  
**Mille**, *a thousand*; mile, million.  
**Minuor**, *to lessen*; **Minor**, *less*; minor, diminish, minute.  
**Miser**, *wretched*; miserable, misery, commiserate.  
**Mitis**, *mild*; mitigate.  
**Mitto**, **Missum**, *to send*; mission, admit, remittance, permit.  
**Mollis**, *soft*; emollient, mollify.  
**Moneo**, **Monitum**, *to warn*, *to remind*; monitor, admonition, monument, summon.  
**Mons**, **Montis**, *a hill*; mountain-eer, mound, surmount.  
**Monstro**, *to show*; demonstrate, remonstrance, muster, monster.  
**Mors**, **Mortis**, *death*; mortal, immortality, mortgage, mortify.  
**Multus**, *many*; multiple, multi-form, multitude.  
**Munio**, **Munitum**, *to fortify*; munition, ammunition.  
**Munus**, **Muneris**, *a gift, office*; remunerate, common.  
**Narro**, *to tell*; narrate, narrative.  
**Nascor**, *to be born*; natal, native, naturalist, supernatural.  
**Nasus**, *the nose*; nasal.  
**Navis**, *a ship*; naval, navigator, navigable, navy.  
**Necto**, **Nexum**, *to tie, to bind*; connect, annexation.  
**Niger**, *black*; negro, nigger.  
**Nihil**, *nothing*; annihilate.  
**Niveo**, *to wink*; connive.  
**Noceo**, *to hurt*; **Noxia**, *harm*; noxious, nuisance, annoy.  
**Nomen**, **Nominis**, *a name*; nominal, denominator, noun.  
**Norma**, *a rule*; normal, enormity.  
**Novem**, *nine*; November, nonagon.  
**Novus**, *new*; novel, renovate, innovation, novice.  
**Nox**, **Noctis**, *night*; nocturnal, equinox.  
**Nullus**, *none*; annul, nullify, null.  
**Numerus**, *a number*; enumerate, innumerable, supernumerary.  
**Nutrio**, **Nutritum**, *to nourish*; nurture, nurse, nursery.  
**Oblivio**, *forgetfulness*; oblivious.  
**Octo**, *eight*; October, octave.
- Oculus**, *the eye*; ocular, oculist, binocular, ogle.  
**Odium**, *hatred*; odious.  
**Oleum**, *oil*; oleaginous, petroleum.  
**Omnis**, *all*; omnipotent, omnibus, omnipresent.  
**Onus**, **Oneris**, *a burden*; onerous, exonerate.  
**Opacus**, *dark*; opaque, opacity.  
**Opus**, **Operis**, *a work*; operation, operative.  
**Ordo**, **Ordinis**, *order, rank*; orderly, disorder, ordain, ordinance.  
**Orior**, **Ortus**, *to rise*; **Origo**, *the beginning*; oriental, origin, aborigines.  
**Oro**, **Oratum**, *to speak*; **Os**, **Oris**, *the mouth*; adore, oracle, oration, orator, orison, oral, orifice.  
**Otium**, *ease*; negotiate, disease.  
**Ovum**, *an egg*; oval, oviform, oviparous.  
**Pactus**, *fixed, driven in*; compact.  
**Pando**, **Pansum**, *to spread*; expand, compass.  
**Panis**, *bread*; pantry, pannier.  
**Par**, *equal*; parity, compare, compeer, nonpareil.  
**Pario**, *to bring forth*; parent, viviparous, oviparous.  
**Paro**, **Paratum**, *to make ready*; apparel, apparatus, preparatory.  
**Pasco**, **Pastum**, *to feed*; pastor, pasture, repast.  
**Pater**, *a father*; **Patria**, *one's native country*; patrimony, paternal, patrician, compatriot.  
**Papper**, *poor*; pauperism.  
**Pectus**, **Pectoris**, *the breast*; pectoral, expectorate, panpet.  
**Pello**, **Pellatum**, *to call, to name*; appeal, appellation, repeal.  
**Pello**, **Pulsum**, *to drive*; compel, expulsion, impulsive, pulse.  
**Pendeo**, **Pensum**, *to hang*; append, dependence, pendulum, suspense.  
**Pene**, *almost*; peninsula, penumbra, penultimate.  
**Pena** (**Poena**), *punishment*; penal, penitentiary, repent.  
**Pes**, **Pedis**, *a foot*; biped, pedest, pedestrian, impede, expedient, pedal.  
**Pestis**, *a plague*; pest, pestilence.



- Peto, Petitus**, *to seek*; petitioner, compete, incompetent, centripetal.
- Pingo, Pictum**, *to paint*; picture, pigment. depict, **Picts**.
- Piscis**, *a fish*; piscatorial, expiscate.
- Placeo**, *to please*; **Placo**, *to appease*; complacent, placidity.
- Plebs**, *the common people*; plebeian.
- Fleo, Pletum**, *to fill*; plethoric, replenish, accomplish, complete.
- Plico, Plicatum**, *to fold*; **Plexus**, *twisted*; complicate, pliable, multiply, centuple, complex.
- Floro**, *to cry out*; deplorable, exploration, implore.
- Plumbum**, *lead*; plumber, plummet, plumb.
- Pondus, Ponderis**, *weight*; ponder, preponderate, pound.
- Pono, Positum**, *to place*; depone, composer, compositor, deposit, postpone, proposition.
- Porto**, *to carry*; **Porta**, *a gate*; **Portus**, *a harbour*; export, porter, portmanteau, importation, reporter, insupportable, port, portico, deportment.
- Potens, Potentis**, *powerful*; potentate, potential, impotent.
- Prehendo, Prehensum**, *to take*; apprehend, comprehensive.
- Primus**, *first*; prime, primer, primate, primrose, premier.
- Privo**, *to take away*; deprive, privilege, privacy.
- Probo, Probatum**, *to prove*; **Probus**, *honest*; probe, probity, probationer, proof, reprobate.
- Proximus**, *nearest, next*; proximity, approximate.
- Puer**, *a boy*; puerile.
- Pugno**, *to fight*; **Pugnis**, *the fist*; pugnacious, impugn, pugilist.
- Pungo, Punctum**, *to thrust, to v x*; punch, puncture.
- Purgo**, *to make clean*; **Purus**, *clean*; purge, purgatory, impure.
- Pus, Puris**, *corrupt matter*; **Putris**, *rotten*; purulent, putrid, putrefaction.
- Quatuor**, *four*; **Quadra**, *a square*; quart, quadrille, quadruped, quadrangle, quadrant.
- Quero, Quaesitum**, *to ask*; query, inquire, conquer, inquest.
- Quatio, Quassum**, *to shake*; discuss, concussion.
- Radius**, *a beam, a ray*; radiate, irradiate, rayless.
- Radix, Radicis**, *a root*; radical, eradicate.
- Ranceo**, *to be stale*; rancid, rancorous, rankle.
- Ratio**, *reason*; ration, irrational.
- Rego, Rectum**, *to rule*; **Rectus**, *straight*; regent, correct, rector, reign, indirect, rectify, rectangle.
- Rex, Regis**, *a king*; regal, realm.
- Repo, Reptum**, *to creep*; reptile.
- Rigo**, *to water*; irrigate.
- Rivus, a stream; **Ripa**, *the bank of a river*; rival, derive, river, rill, arrive.**
- Rodo**, *to wear away, to gnaw*; corrode, corrosion.
- Rogo, Rogatum**, *to ask*; arrogate, derogate, prorogue.
- Rota**, *a wheel*; **Rotundus**, *round*; rotation, routine, rotundity.
- Ruber**, *red*; ruby, rubric, robin.
- Rumpo, Ruptum**, *to break, to burst*; rupture, corrupt, eruption, interrupt.
- Rus, Ruris**, *the country*; rural, rustic.
- Sanctus**, *holy*; saint, sanctify, sanctimonious.
- Sagus**, *wise*; sage, sagacity.
- Salus, Salutis**, *safety, health*; salutary, salutation.
- Sanguis**, *blood*; sanguine, sanguinary, cousin.
- Sapio**, *to taste, to be wise*; sapid, sapient, insipid, savour.
- Satis**, *enough*; **Satur**, *full*; satisfy, satiate, insatiable, assets.
- Scando, Scansum**, *to climb*; scan, ascend, condescension, transcendental.
- Scindo, Scissum**, *to cut*; scissors, rescind, abscess, scion, chisel.
- Scio, Scitum**, *to know*; science, scientific, conscience, omniscient.
- Scribo, Scriptum**, *to write*; scribe, inscribe, descriptive, subscrip-

- tion, manuscript, scribble, non-descript, postscript.
- Scrutor**, *to search, to seek*; scrutiny, inscrutable.
- Sculpo**, *to carve*; sculptor.
- Scurra**, *a scoffer*; scurrilous.
- Seco**, **Sectum**, *to cut*; sect, sectarian, bisect, insect, secant, segment, intersection.
- Sedeo**, **Sessum**, *to sit*; sedentary, sedan, session, besiege, assiduous, assize, president, super-sede.
- Semi**, *half*; semicircle, semitone.
- Senex**, **Senis**, *old*; senior, signior, senator, senile.
- Septem**, *seven*; September, septennial, *septuagint*.
- Sequor**, **Secutum**, *to follow*; sequel, consequence, persecute.
- Sex**, *six*; sexagenarian, bissextile.
- Sicco**, *to be dry*; desiccate.
- Sidus**, **Sideris**, *a star*; sidereal.
- Signum**, *a mark*; sign, signal, signature, assignee, design.
- Silva**, *a wood*; silvan, savage.
- Simul**, *at the same time*; simultaneous, assemble.
- Socius**, *a companion*; social, society, association.
- Sol**, *the sun*; solar, solstice, parasol.
- Solidus**, *firm, hard*; **Soldus**, *a piece of money*; solidity, consolidate, solder, soldier, consol.
- Solvo**, **Solutum**, *to loose, to melt*; solution, soluble, solve, insolvent, irresolute, absolutely.
- Somnus**, *sleep*; **Sopor**, *deep sleep*; somnolent, somnambulist.
- Sordidus**, *mean, covetous*; sordid.
- Spargo**, **Sparsum**, *to spread, to scatter*; sparse, dispersion, intersperse.
- Specio**, **Spectrum**, *to see*; **Species**, *a kind*; species, specify, inspect, circumspect, retrospective.
- Spero**, *to hope*; despair, desperation, desperado.
- Spiro**, *to breathe*; spirit, aspire, conspiracy, expiry, perspiration, inspire, respirator, sprits.
- Spolium**, *plunder, booty*; spoil, spoliation, despoiler.
- Spondeo**, **Sponsum**, *to promise*; respond, correspondent, despondency, espouse, sponsor.
- Sponte**, *of one's own accord*; spontaneous.
- Sterilis**, *barren, unfruitful*; sterile, sterility.
- Stinguo**, **Stinctum**, *to put out light, to mark*; distinguish, extinct, indistinct.
- Sto**, **Statum**, *to stand*; **Stans**, *standing*; state, statue, statute, stationery, stationary, armistice, circumstance, distance.
- Stupeo**, *to be insensible, astonished*; stupid, stupefaction.
- Suadeo**, **Suasum**, *to advise*; dissuade, persuasive, suasion.
- Suavis**, *sweet*; suavity, assuage.
- Subtilis**, *finely woven, thin*; subtle, subtle, subtlety.
- Summus**, *the highest*; **Summa**, *the whole*; sum, summit, summary, consummate.
- Sumo**, **Sumptum**, *to take*; assume, consumptive, inconsumable, presumption.
- Taceo**, *to be silent*; tacit, taciturn, reticence.
- Tango**, **Tactum**, *to touch*; tact, contact, tangent, tangible, attachment, attain, contagious.
- Tego**, **Tectum**, *to cover*; tegument, detective, protector.
- Temno**, **Temptum**, *to despise*; condemn, contemptible, contemptuous.
- Tempero**, *to mix, to moderate*; temper, temperance, temperature.
- Tempus**, **Temporis**, *time*; temporal, temporary, contemporary, tense, extempore.
- Teneo**, **Tentum**, *to hold*; tenant, tenacious, tenable, tenement, attain, continent, contents, detention, discontinue, entertainer, abstinence, malcontent, pertain.
- Tento**, *to try, to prove*; tempt, temptation, unattempted.
- Tepeo**, *to be warm*; tepid, tepify.
- Tero**, **Tritum**, *to rub, to wear*; trite, attrition, contrite.
- Terra**, *the earth*; terrestrial, terrace, territory, terrier, country,

- disinter, frontier, interment, Mediterranean, subterraneous.
- Tingo, Tinctum**, *to dip, to colour*; tinge, attainment, tincture, untinged.
- Tollo**, *to lift up*; **Tolero**, *to suffer, to endure*; tolerate, tolerant, extol.
- Tono**, *to thunder*; **Tonus**, *a stretching, a sound*; astonish, detonate, intonation, monotonous.
- Torqueo, Tortum**, *to twist*; tortuous, torture, distort, retort.
- Torreo, Tostum**, *to parch, to burn*; torrent, torrid, toast.
- Tres, Tria**, *three*; treble, triangle, trilateral, trident, trigonometry, trio, trinity.
- Tribuo, Tributus**, *to give*; tribute, attribute, contribution, distribute.
- Trudo, Trusum**, *to thrust*; trusion, intruder, protrude, obtrusive.
- Tuber**, *a swelling*; tuberos, protuberance, tubercle.
- Tueor, Tuitum, Tutum**, *to see, to protect*; tutor, intuition.
- Tumeo**, *to swell*; **Tumulus**, *a mound*; tumour, contumely, contumacy, tumult, tomb.
- Uterior, farther; **Ultimus**, *last*; ulterior, ultimate, antepenult.**
- Umbra**, *a shadow*; umbrage, umbrageous, umbrella, penumbra.
- Unda**, *a wave*; undulate, inundate, abound, redundant.
- Ungo**, or **Unguo, Unctum**, *to anoint*; unction, unctuous, unguent, ointment.
- Urbs**, *a city*; urbane, urbanity, suburban.
- Uro, Ustum**, *to burn*; combustion, incombustible.
- Utor, Usum**, *to use*; **Usurpo**, *to take unlawfully, to use often*; utility, usury, abuse, perusal.
- Vacca**, *a cow*; vaccine, vaccination.
- Vaco**, *to be empty*; vacant, vacation, vacancy, evacuate, vacuum.
- Vado**, *to go*; evade, invasion, pervade, wade.
- Valeo**, *to be strong, to have worth*; **Vale**, *farewell*; valid, valiant, convalescent, valour, invalid, value, prevalent. valediction.
- Vapor**, *steam*; vapour, evaporate.
- Varius**, *different, changeable*; vary, variety, variegate, invariable.
- Vasto**, *to lay waste*; devastation.
- Veho, Vectum**, *to carry*; convey, conveyancer, vehicle, invective.
- Velox**, *swift*; velocity, velocipede.
- Velo**, *to hide*; **Velum**, *a cover*; veil, reveal, develope, envelope.
- Vendo**, *to sell*; vend, vender.
- Venio, Ventum**, *to come*; advent, avenue, convent, contravene, covenant, eventful, intervention, inventor, preventive, venture.
- Ventus**, *the wind*; vent, ventilate.
- Ver**, *the spring*; vernal.
- Verbum**, *a word*; verb, verbose, proverbial.
- Vereor**, *to fear*; reverend, irreverent, reverence.
- Verto, Versum**, *to turn*; avert, advertise, anniversary, conversion, diverse, controversy, inadvvertent, pervert, traverse.
- Verus**, *true*; aver, verity, verdict, veracious.
- Vestis**, *a covering, a dress*; vest, vesture, divest, investment.
- Vetus old**; veteran.
- Via**, *a way*; devious, obvious, obviate, impervious, convoy, invoice, trivial, *viâ*.
- Vicis**, *a change, a turn*; vicar, vicissitude, viceroy, vicegerent.
- Video, Visum**, *to see*; visible, evident, invisibility, provide, revise, visor, visitor, supervisor.
- Vigil**, *watchful*; vigil, vigilant.
- Vigeo**, *to grow*; **Vigor**, *strength*; vegetable, vigour, invigorate.
- Vinco, Vincum**, *to conquer*; victor, invincible, vanquish, victim.
- Vindex**, *a protector, an avenger*; vengeance, vindicate.
- Vir**, *a man*; **Virtus, Virtutis**, *bravery*; virago, virile, decemvirate, virtue, virtuous.
- Vireo**, *to be green*; verdant, verdure.
- Virus**, *poison*; virulent, virulence.
- Vita**, *life*; vital.
- Vivo, Victum**, *to live*; vivid, victuals, revive, convivial, survivor.

**Voco, Vocatum**, *to call*; **Vox**, **Vocis**, *the voice*; vocal, vocative, vocation, vociferate, advocate, convoke, equivocate, invocation, irrevocable, vocalist.  
**Volo, Volatum**, *to fly*; volatile, volley.  
**Volo, to will, to wish; voluntary, volunteer, benevolent, malevolence.  
**Volvo, Volutum**, *to roll*; voluble, volume, convolvulus, evolu-**

tion, involve, revolver, revolt, vault.

**Voro, to eat up; voracious, devour, carnivorous, omnivorous.  
**Voveo, Votum**, *to promise sacredly, to vow*: votary, vote, devotee.  
**Vulcanus, he god of fire**; Vulcan, volcano, volcanic.  
**Vulgus, the common people**; vulgar, divulge, promulgate.  
**Vulnus, Vulneris**, *a wound*; invulnerable.**

## GREEK ROOTS.

**Adelphos, a brother; adelphi, Philadelphia.  
**Ago, to lead**; **Agogos, a leader**; demagogue, synagogue, stragem, pedagogue.  
**Agon, a contest**; agony, antagonist.  
**Akuo, to hear**; acoustics.  
**Algos, pain**; neuralgia, odontology.  
**Alpha, Beta, the first two Greek letters**; alphabet.  
**Angello, to bring tidings**; angel, archangel, evangelist.  
**Anthos, a flower**; anther, anthology, polyanthus.  
**Anthropos, a man**; misanthrope, philanthropist.  
**Arche, beginning, sovereignty**; arch, archangel, archbishop, monarch, heptarchy, oligarchy, patriarch, tetrarch.  
**Arktos, a bear**; arctic, antarctic.  
**Aristos, best**; aristocracy, aristocrat.  
**Astron, a star**; astronomer, astrology.  
**Athletes, a wrestler**; athlete, athletic.  
**Atmos, vapour**; atmosphere.  
**Autos, self**; autobiography, autocrat, automaton, autograph.  
**Bapto, to dip**; baptist, baptism.  
**Baros, weight**; barometer, barytone.  
**Basis, the bottom**; base, debase, basis, bashful.  
**Biblos, a book**; bible, bibliopole, bibliomaniac.**

**Bios, life**; biography, amphibious.  
**Botane, a plant**; botany, botanist.  
**Bronchos, the windpipe**; bronchitis, bronchial.  
**Chole, bile**; melancholy, choler, choleric.  
**Choros, a band of singers**; choir, choral, chorister.  
**Chroma, colour**; achromatic, chromatrope, chromo-lithograph.  
**Chronos, time**; chronology, chronometer, chronic, chronicle, anachronism.  
**Chrusos, gold**; chrysolite, chrysoalis.  
**Deka, ten**; decalogue, decagon, decade.  
**Demos, the people**; demagogue, democrat, epidemic.  
**Despotes, a master**; despot, despotism.  
**Dosis, a giving**; dose, antidote, anecdote.  
**Doxa, Dogma, an opinion, glory**, heterodox, paradox, orthodox, dogma, dogmatic, doxology.  
**Drus, an oak**; druid, druidism, dryad.  
**Dunamis, power**; dynamics, dynasty.  
**Eiron, a dissembler**; irony, ironical.  
**Epos, a word, a heroic poem**; epic, orthoepey.  
**Ergon, a work**; surgeon, energy, metallurgy.  
**Etumos, true**; etymology.  
**Eu, well**; euphony, eulogium, evangelist, eucharist.  
**Galax, milk**; galaxy.



**Gameo**, *to marry*; bigamy, polygamy, misogynist.

**Gaster**, *the stomach*; gastric, gastronomy.

**Ge**, *the earth*; geography, geologist, geometry, apogee, perigee.

**Genos**, *kind or race*; **Gennao**, *to produce*; genealogy, heterogeneous, hydrogen, oxygen.

**Glossa**, **Glotta**, *the tongue*; glossary, polyglot, gloss.

**Glupho**, *to carve*; hieroglyphics.

**Gonia**, *a corner, an angle*; diagonal, polygon, heptagon, trigonometry, coign.

**Grapho**, *to write*; graphic, autograph, biographer, calligraphy, lithographic, telegraph, photograph.

**Gramma**, *a letter, a writing*; grammar, epigram, diagram, programme, telegram.

**Helios**, *the sun*; heliacal, heliotrope, parhelion, aphelion.

**Hemi**, *half*; hemisphere.

**Hepta**, *seven*; heptarchy, heptagon, hebdomadal.

**Hex**, *six*; hexagon, hexameter.

**Hippos**, *a horse*; hippodrome, hippopotamus.

**Hodos**, *a way*; exodus, episode, methodist, periodical, synod.

**Homos**, *similar*; homologous, homogeneous.

**Hudor**, *water*; hydraulics, hydrogen, hydrophobia, hydra, dropsy.

**Huper**, *above*; hyperbole, hypercritical.

**Ichthus**, *a fish*; ichthyology.

**Idios**, *peculiar*; idiom, idiot, idiosyncrasy.

**Iota**, *the smallest letter of the Greek alphabet*; iota, jot.

**Isos**, *equal*; isosceles, isoperimetrical, isothermal.

**Kaio**, *to burn*; caustic, encaustic, holocaust.

**Kalos**, *beautiful, fair*; calligraphy, kaleidoscope.

**Kalupto**, *to cover*; apocalypse.

**Klepto**, *to steal, to hide*; kleptomania.

**Kosmos**, *beauty, the world*; cos-

metic, cosmography, cosmopolite, microcosm.

**Kratos**, *strength, government*; aristocracy, democracy, autocrat.

**Krupto**, *to hide*; crypt, apocrypha, cryptograph.

**Kuklos**, *a circle*; cycle, cyclone, cyclopædia, bicycle, tricycle.

**Laos**, *the people*; lay, laity.

**Leipo**, *to leave*; eclipse, ellipse.

**Lepis**, *a scale*; leper, leprosy.

**Lithos**, *a stone*; lithograph, chrysolite.

**Logos**, *a word, a reason, discourse, science*; logic, apology, astrologer, catalogue, decalogue, etymology, homologous, prologue.

**Luo**, *to loose*; **Lusis**, *a loosening*; analysis, palsy, paralyse.

**Mania**, *madness*; maniac, bibliomaniac.

**Martur**, *a witness*; martyr, martyrdom.

**Mathema**, *science*; mathematics.

**Mechanao**, *to invent*; machine, mechanic, mechanics, mechanician.

**Melan**, *black*; melancholy, Melanesia.

**Melos**, *a song*; melody, melodrama.

**Meter**, *a mother*; metropolis.

**Metron**, *a measure*; metre, symmetry, barometer, chronometer, geometry, hexameter, perimeter, thermometer, trigonometry.

**Mikros**, *little*; microscope, microcosm.

**Mimos**, *one who imitates*; mime, mimic, pantomime.

**Misos**, *hatred*; misanthrope, misogynist.

**Monos**, *alone*; monotony, monarch, monastery, monogram, monologue, monopoly.

**Muthos**, *a fable*; myth, mythology.

**Naus**, *a ship*; nautical, argonaut.

**Nekros**, *dead*; necropolis, necromancy.

**Neos**, *new*; neophyte, Neapolitan.

**Nesos**, *an island*; Polynesia, Melanesia, Chersonese.



- Nomas**, *pasturage*; nomadic.  
**Nomos**, *a law*; astronomy, economist, Deuteronomy.  
**Ode**, *a song, a poem*; melodious, parody, prosody, comedy, tragedy.  
**Oikeo**, *to dwell*; **Oikos**, *a house*; diocese, economy, parish, parochial, perioeci, autoeci.  
**Onoma**, *a name*; anonymous, synonyme, patronymic.  
**Optomai**, *to see*; **Ophthalmos**, *the eye*; optics, optician, ophthalmic.  
**Orama**, *a sight*; diorama, panorama, cosmorama.  
**Ornis**, **Ornithos**, *a bird*; ornithology.  
**Orthos**, *right, straight, exact*; orthodox, orthography, orthoepey.  
**Pan**, *the whole*; panoply, pantheon, panorama, pantomime.  
**Pathos**, *feeling*; pathos, pathetic, apathy, antipathy, sympathiser, pathology.  
**Pente**, *five*; pentagon, pentameter, pentateuch, pentecost.  
**Petros**, *a rock, a stone*; Peter, petrify, petrefaction, petroleum.  
**Phago**, *to eat*; anthropophagi, sarcophagus.  
**Pharmakon**, *a drug*; pharmacy, pharmacopœia.  
**Philos**, *a lover, a friend*; philanthropy, philosopher, philter.  
**Phobos**, *fear*; hydrophobia.  
**Phone**, *the voice*; phonography, euphony, symphony, telephone.  
**Phos**, **Photis**, *light*; photograph, phosphorus.  
**Phren**, *the mind*; phrensy, frenzy, frantic.  
**Phthisis**, *decay, a wasting away*; phthisic.  
**Phthongos**, *sound*; diphthong, triphthong.  
**Phusis**, *to bring forth, nature*; physics, metaphysics, physiology.  
**Pleura**, *a side, a rib*; pleurisy.  
**Poeio**, *to make*; poet, poesy, poetaster, onomatopœia.  
**Poleo**, *to sell*; bibliopole, monopolist.  
**Polis**, *a city*; Constantinople.
- Heliopolis**, metropolis, cosmopolitan, police, polite, politician.  
**Polus**, *many*; polygamy, polygon, polyanthus, polyglot, polypus.  
**Poros**, *a passage*; pore, porous, Bosphorus.  
**Potamos**, *a river*; hippopotamus, Mesopotamia.  
**Pous**, **Podos**, *the foot*; antipodes, tripod, chiropodist.  
**Presbuteros**, *elder, a priest*; presbyter, presbyterian.  
**Pur**, *fire*; pyre, pyrotechnist, pyrometer, empyrean.  
**Rheo**, *to flow*; catarrh, diarrhœa, hemorrhage, rhetoric.  
**Rhin**, *the nose*; rhinoceros.  
**Ruthmos**, *measured time*; rhyme.  
**Sarx**, **Sarkos**, *flesh*; sarcophagus, sarcasm.  
**Schisma**, *a division*; schism.  
**Skeptomai**, *to look about, to doubt*, sceptic, scepticism.  
**Skoepo**, *to see, to behold*; scope, telescope, microscope.  
**Sophos**, *wise*; philosopher, sophist.  
**Stello**, *to send*; apostle, epistle.  
**Stethos**, *the breast*; stethoscope.  
**Sthenos**, *vigour, power*; calisthenics.  
**Taktos**, *put in order*; **Taxis**, *order*; tactics, syntax.  
**Taphos**, *a tomb*; epitaph, cenotaph  
**Tautos**, *the same*; tautology.  
**Techne**, *art*; technical, technology polytechnic, pyrotechnic.  
**Telos**, *distant, an end*; telegraph, telegram, telescope.  
**Theos**, *god*; atheism, theocracy, theology, pantheon, apotheosis.  
**Thermos**, *heat*; thermometer, isothermal.  
**Tomos**, *a cutting*; tome, anatomy, atom, epitome.  
**Topos**, *a place*; topic, topography  
**Toxikon**, *poison*; toxicology, intoxicate.  
**Tropos**, *a turning*; tropic, heliotrope, trophy.  
**Turannos**, *a despot, a cruel master*; tyrant, tyranny.  
**Zone**, *a girdle*; zone.  
**Zoon**, *an animal*; zoology, zoologist, zoological, zodiac.

## ANGLO-SAXON ROOTS.

- Ac**, *an oak*; acorn, Auckland, Acworth.
- Aer**, *before*; early, ere, erst, erelong.
- Bald**, *brave*; bold, embolden, Ethelbald, Baldwin.
- Bana**, *destruction*; bane, baneful, henbane.
- Bannan**, *to proclaim*; ban, banns.
- Beacan**, *a sign*; beck, beckon, beacon.
- Beatan**, *to beat*; bat, batter, battle, beetle.
- Beran**, *to carry, to bring forth*; bear, forbear, barrow, bier, birth, burden, berth.
- Betan**, *to improve*; better, boot (to profit), booty, abettor.
- Biddan**, *to pray, to bid*; bidding, bead, beadle.
- Bindan**, *to fix*; bind, bond, bandage, boundary, husband.
- Blawan**, *to blow, to breathe*; blow, blossom, bladder, blast, blister, bluster, blaze, blush, bloat.
- Bodian**, *to announce, to foretell*; bode, abode, forebode.
- Brad**, *broad*; breadth, broadside, board, abroad.
- Brecan**, *to break*; breaker, breakfast, breach, brake, brink.
- Bugan** or **Bigan**, *to bend, to yield*; bow, bowsprit, bay, bight, bugle, elbow, buxom.
- Burh**, *a city*; **Beorgan**, *to secure*; burgh, burgher, burrow, burglary, harbour, harbinger.
- Byrnan**, *to burn*; burn, burnish, brown, bronze, brand, brandy, brindled, auburn, brimstone, brunt, brunette.
- Clufan**, *to cleave*; **Clifan**, *to adhere*; cleaver, cliff, clover, clay.
- Cracian**, *to crack*; creak, cricket, screech, shriek, croak.
- Cnawan**, *to know, to be able*; can, con, cunning, keen, ken, king.
- Cnyttan**, *to knit*; knit, knot, network.
- Cyn**, *people*; **Cennan**, *to produce*; kindred, kin, kind.
- Daeg**, *a day*; daylight, dawn, daisy.
- Dael**, *a part*; dole, deal, dealer.
- Deman**, *a judge*; deem, deemster or dempster, doomsday.
- Dic**, *a trench*; ditch, ditcher, dyke.
- Dragan**, *to draw*; draggel, drawbridge, drawl, dray, drain, dredge, draughtsman, draft.
- Drygan**, *to dry*; dryness, drysalter, drought, drug.
- Drypan**, *to drop*; drip, dribble, drop, drivel.
- Dyppan**, *to dip*; **Dufian**, *to dive*; dipper, dibble, dabble, daub, diver, depth.
- Dyn**, *a noise*; din, dun.
- Eage**, *the eye*; daisy, eyelid, eyelet.
- Eald**, *old*; eld, elder, alderman.
- Faran**, *to go*; fare, farewell, seafaring, wayfarer, ford.
- Fedan**, *to feed*; food, fodder, father.
- Fian**, *to hate*; fiend, foemen, feud.
- Fleogan**, *to fly*; flight, fledge, flicker, flurry, flag.
- Flowan**, *to flow*; **Fleotan**, *to float*; flord, flotilla, flag.
- Friccian**, *to jump*; frisk, freak, frog.
- Gabban**, *to scoff*; gab, gabble, gibe, jabber.
- Galan**, *to sing*; nightingale.
- Gamian**, *to sport*; game, gamble, gamester.
- Gast**, *the breath, a spirit*; gas, aghast, ghost, ghastly.
- Gerefa**, *a governor, a steward*; grieve, reeve, sheriff, landgrave.
- Gifan**, *to give*; gift, forgive.
- Glomung**, *twilight*; gloom, glimmer, gleam.
- Grafan**, *to grave, to dig*; engrave, groove, grub, ingraft.
- Grapian**, *to grapple*; grapple, grappel, grope, grabble, grovel.
- Gyrdan**, *to bind*; gird, girder, girth, garden, yard.
- Ham**, *a town*; hamlet, home.
- Hus**, *a dwelling*; house, housewife, hussy, husband, hustings.

- Laedan**, *to lead*; leader, ladder, mislead.
- Laetan**, *to let, to hinder*; let, lease, lessee.
- Leaf**, *consent*; leave, believer, relief.
- Lecgan**, *to place down*; inlay, law, lawless, lea, ledger, lowly, knowledge.
- Loma**, *utensils*; loom, lumber, powerloom.
- Lyft**, *the air*; lofty, aloft.
- Macian**, *to make*; maker, match, inmate.
- Maengan**, *to mix*; mingle, among, mongrel, commingle.
- Mase**, *a whirlpool*; maze, mazy, amazement.
- Mirc**, *darkness*; mirksome, murky.
- Mona**, *the moon*; moonbeam, Monday, month.
- Nese**, *the nose*; nose, ness, nozzle, sneeze, snore, snooze.
- Niman**, *to take*; nim, nimble, benumb.
- Pic**, *a point*; pick, picket, peck, peak, beak, pike.
- Rathe**, *soon*; rath, rather.
- Reaf**, *spoil*; reaver, bereft, rover, robbery, ravin.
- Scafan**, *to scrape*; scavenger, shave, shaving, scab, shabby.
- Scale**, *a shell, a husk*; scale, scalp, scallop, shell, shield, skull, shieling.
- Scathan**, *to hurt*; scath, scathless, unscathed.
- Sceotan**, *to shoot, to send out*; shoot, shot, shutter, shuttle, sheet, scud.
- Scipan**, *to shape*; shapeless, ship, shipwright, shop.
- Scyran**, *to cut, to separate*; scar, score, scare, scarf, shore, sharper, shear, shire, skirt, shred.
- Scufan**, *to thrust*; shove, shovel, shuffle, scuffle, scoop.
- Snican**, *to creep*; snake, snail, snug, sneak.
- Spell**, *a message, a charm*; gospel, spell.
- Stow**, *a place*; stow, bestow.
- Sur**, *sour*; surly, sorrel.
- Syllan**, *to give*; sell, handsel, sale, unsold.
- Thirlian**, *to pierce*; thrill, trill, drill, nostril.
- Trywsian**, *to believe*; trow, troth, untrue, truthful, trusty.
- Wardian**, *to look at, to defend*; ward, warden, guard, guardian, wary.
- Wendan**, *to go*; wend, went, wanderer.
- Witan**, *to know*; **Wise**, *wise*; wizard, wistful, witty, witness.



## **COLLINS' SERIES OF ENGLISH DICTIONARIES.**

- The Household Dictionary of the English Language.** Etymological, Explanatory, Pronouncing, and Synonymous. With a History of the English Language. Illustrated by 1000 Engravings on Wood, and 20 full-page Plates, Royal 8vo, half-bound morocco.
- The Library Dictionary,** Etymological, Pronouncing, and Synonymous. With an Appendix. Illustrated by 1000 Engravings on Wood. Medium 8vo, cloth extra; also half-bound calf, or morocco.
- The Cabinet Dictionary,** Etymological and Pronouncing. 750 Engravings, square post 8vo, cloth extra; also half-bound calf, 990 pages.
- The Globe Dictionary,** Etymological and Pronouncing. 500 Engravings, crown 8vo, cloth extra; also half-bound Persian, 776 pages.
- The New Large Type Dictionary.** With an Appendix, containing Abbreviations, Foreign Words and Phrases, Geographical Names, Scripture Names, Form of Address, etc. 350 Illustrations, extra fcap. 8vo, 448 pages, cloth lettered.
- The Clear Type Dictionary.** With an Appendix of Foreign Words and Phrases, and 300 Illustrations. Fcap. 8vo, 288 pages, cloth lettered.
- Dictionary of the Derivations of the English Language,** in which each word is traced to its Primary Root. Forming a Text-book of Etymology. With Definitions, and the Pronunciation of each word, 400 pages, 18mo, cloth lettered.
- Dictionary of Synonyms of the English Language.** 368 pages, demy 18mo, cloth lettered.
- Dictionary of Scientific Terms,** Etymological and Pronouncing. Edited by Wm. Rossiter. Containing 14,000 References, and Illustrated by upwards of 600 Wood Engravings. Post 8vo, cloth.
- The Pocket Spelling Guide, and Letter-Writer's Companion.** Containing 15,000 of the most difficult Words in the English Language. Cloth, gilt edges.

## **COLLINS' TRADE RECKONERS.**

- The National Ready Reckoner.** A Series of Commercial Tables, containing Calculations suited for all Trade purposes, ranging from the One Hundred-and-Twentieth of a Penny up to Twenty-one Shillings, and from Units to Ten Thousand, with Profit and Discount Tables, and Wages Calculator. Cloth; also full-bound sheep.
- The Universal Ready Reckoner and Universal Trade Tables.** Containing Calculations from One-Thirty-Seventh of a Penny to a Pound; Profit, Discount, and Commission Tables; on Cost and off Selling Prices; Interest, Dividend and Foreign Money Tables, Workmen's Wages Calculator; relative prices of cwts., quarters, and pounds; and Tables for General Trades. 18mo, cloth.
- The Commercial Ready Reckoner and Trade Tables.** Containing Calculations from One-Sixteenth of a Penny to a Pound; Interest, Profit, Discount, and Commission Tables, with a series of Trade Tables, also Rate Tables for cwts., quarters, and pounds. 18mo, cloth.
- The Handy Ready Reckoner; or, Commercial Handbook.** For finding the Value of any number or quantity of any kind of Merchandise; with Tables of Interest, Income and Wages Calculations. 18mo, cloth.
- The Pocket Ready Reckoner.** Containing Calculations from One-Sixteenth of a Penny to a Pound, with Income and Wages Calculations. Thin and light, to fit the vest pocket.
- Tables of Interest,** at 3,  $3\frac{1}{2}$ , 4,  $4\frac{1}{2}$ , and 5 per cent. on £1 to £5000 for 1 Day to 5 Years, with Tables of Brokerage and Commission, from One-Eighth to Five per cent., and Profit and Discount Tables. By J. Leslie, Accountant. Extra Fcap. 8vo, cloth, 127 pages.



## Collins' Elementary Science Series.

*Adapted to the requirements of the South Kensington Syllabus, for  
Students in Science and Art Classes, and Higher and  
Middle Class Schools.*

---

*Printed uniformly in fcap. 8vo, with numerous Illustrations,  
cloth lettered.*

1. **Practical Plane and Solid Geometry.** New Edition. Including Chapter on Graphic Arithmetic. By H. Angel, Islington Science School, London.
2. **Machine Construction and Drawing.** By E. Tomkins. 2 vols.
- 4A. **Naval Architecture: Laying-off Wood and Iron.** By S. J. P. Thearle, F.R.S.N.A. 2 vols. Plates; Text.
- 4B. **Naval Architecture: Ship-building—Wood and Iron Ships.** By S. J. P. Thearle, London. 2 vols. Plates; Text.
5. **Mathematics: A Complete Course of Practical Arithmetic, with Algebra and Euclid.**
6. **Dynamics; or, Theoretical Mechanics.** By J. T. Bottomley, M.A.
- 6A. **Hydrostatics.** By J. T. Bottomley, M.A.
- 6B. **Dynamics and Hydrostatics.** By J. T. Bottomley, M.A.
7. **Applied Mechanics.** By Henry Evers, LL.D.
8. **Acoustics, Light and Heat.** By W. Lees, M.A., Edinburgh. New Edition.
9. **Magnetism and Electricity.** By John Angell, Manchester Grammar School. New Edition.
- 10A. **Inorganic Chemistry.** By Dr. W. B. Kemshead, F.R.A.S., F.C.S. New Edition.
- 10B. **Inorganic Chemistry, 20 Lessons in.** By W. G. Valentin, F.C.S.
- 11A. **Organic Chemistry.** By W. M. Watts, D.Sc. (Lond.).
- 11B. **Practical Chemistry.** By J. Howard, F.C.S. New Edition, with an Appendix on Chemical Analysis.
12. **Geology.** By Dr. Davis.
13. **Mineralogy.** By J. H. Collins, F.G.S.
14. **Animal Physiology.** By John Angell. New Edition.
- 15A. **Botany—Vegetable Anatomy and Physiology.** By Prof. Balfour.
- 15B. **Systematic and Economic Botany.** By Prof. Balfour.
16. **Biology (General).** By T. C. MacGinley.
17. **Zoology.** By M. Harbison, Newtownards.
- 18A. **Principles of Coal Mining.** By J. H. Collins, F.G.S.
- 18B. **Principles of Metal Mining.** By J. H. Collins, F.G.S.
20. **Navigation.** By W. H. Barham, Lieut. R.N.R.
21. **Nautical Astronomy.** By H. Evers, LL.D.
- 22A. **Steam Engine: Land and Marine.** By H. Evers, LL.D.
23. **Physical Geography.** By J. MacTurk, F.R.G.S.
24. **Agriculture.** By Prof. Wrightson. New Edition.
- 25B. **Dietetics.** By E. F. Willoughby, M.B.
26. **Sanitary Science, as applied to the Healthy Construction of Houses.** By R. Scott Burn, C.E.
27. **Astronomy.** By John I. Plummer, The Observatory, Durham.
28. **Qualitative Chemical Analysis.** By F. Beilstein.
29. **Physiography.** By Hugh Dickie, LL.D. Illustrated.

*Most of the above Subjects can also be had in our Advanced Science Series.*

---

*London, and Herriot Hill Works, Glasgow.*

